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Died April 1, 1925

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THOMAS J. WATKINS, M.D.

1863-1925

On April 1, there was suddenly taken away from a life of activity and usefulness, Dr. Thomas J. Watkins, of Chicago, a member of the Advisory Editorial Board of this journal since its inception and continuously interested in its progress and development.

From humble beginnings, after spending early years of toil and drudgery on a farm near Utica, N. Y., where he was born in 1863, Dr. Watkins worked his way through the preparatory schools to fit himself for a professional education. This was completed at Bellevue Medical College, where he obtained his M.D. degree in 1886. Interneships in various institutions followed, including the Woman's Hospital of New York, where he came under the direct tutelage of the late Dr. Thomas Addis Emmet, an association which undoubtedly favored and developed his interest in plastic surgery of the female genital tract. Dr. Watkins subsequently moved to Chicago where he joined the staff of the Northwestern University Medical School and continued in active association with it until the time of his death, when he was Chief of the Department of Gynecology. He was also Attending Gynecologist at St. Luke's Hospital. Dr. Watkins became a Fellow of the American Gynecological Society in 1896 and was actively associated with its work, serving as president in 1915. In addition to membership in the Advisory Editorial Board of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY he functioned in a similar capacity with *Surgery, Gynecology and Obstetrics*. He was likewise active in many other medical societies and closely associated with the development of the American College of Surgeons.

Dr. Watkins was one of the most active and farseeing workers in our specialty. He was an excellent teacher and impressed those with whom he came into personal contact, by his friendliness, gentleness and unsel-

fishness. He was always ready to help others and by his beautiful character endeared himself to a host of friends and associates. Well known as a diagnostician and most skillful in the art of plastic gynecologic surgery, his claim to recognition in American gynecology is centered in the development of the procedure which has been named after him,—the Watkins transposition operation on the uterus. He first described this in 1899, and with Dührssen and Schauta, should receive full credit for perfecting a method which is widely accepted as a reliable means for treating vesicouterine prolapse and for the performance of which he established definite and well-marked indications.

To the memory of Dr. Watkins as a physician of signal ability, modest and unassuming, yet ever friendly, courteous and generous, with high ideals and noble aspirations, to the memory of such a man the editors of the journal are happy to extend these words of praise and remembrance.

G. W. K.

Original Communications

GANGRENE OF THE EXTREMITIES FOLLOWING GYNECOLOGIC OPERATIONS AND THE PUERPERIUM—WITH REMARKS ON EMBOLECTOMY*

By Arthur Stein, M.D., F.A.C.S., New York City

(Visiting Gynecologist, Harlem Hospital; Visiting Gynecologist, Hospital of Joint Diseases; Associate Visiting Gynecologist, Lenox Hill Hospital, New York.)

PERIPHERAL gangrene of embolic origin, due to obstruction of the principal arteries of the affected limb, has been observed to follow the normal puerperium, spontaneous or induced abortions, and gynecologic operations, not to mention operations in the field of general surgery. In many instances the peripheral embolism is not a separate disease but merely a link in an entire chain of emboli in other localities. A compilation of the scattered cases in the literature and two personal observations of this complication were published by me in *Surgery, Gynecology and Obstetrics* in 1916 (xxiii, p. 424) but the time has come to bring the entire subject, from pathogenesis to therapy, again to the attention of the surgeon, as a faint hope is now offered in this desperate complication by the early performance of arteriotomy followed by embolectomy. This helpful intervention which has been rendered possible through the modern technic of vascular surgery will be discussed in detail further on.

The extremely variable cause of the obstruction in the arterial and venous system is best illustrated by the following tabulation adapted from Wormser and brought up to date from my previous publication on this subject:

OBLITERATION IN THE ARTERIAL SYSTEM

"1. Embolism. In septic endocarditis with deposits on the heart valves. Thrombosis of the left heart, chiefly the auricula, the result of septic endocarditis; paradox embolism in case of a patent foramen ovale, naturally rare in a woman who has reached the childbearing age.

*Read at the Thirty-seventh Annual Meeting of the American Association of Gynecologists, Obstetricians and Abdominal Surgeons, held in Cleveland, September, 1924.

"2. Arteritis. Primary (septic and toxic endarteritis); secondary (through propagation of inflammation by contiguity from the adjacent veins).

"3. Thrombosis. Primary (ascending from the uterine artery or its terminal branches at the site of the placenta or after gynecologic operations). In these cases thrombi form in the uterine artery and from there extend through the internal iliac artery into the common iliac artery. Here they are broken off and form emboli in the femoral artery.

OBLITERATION IN THE VENOUS SYSTEM

"1. Phlebitis. Primary (septic and toxic thrombo-phlebitis); secondary (a) through propagation, in metro-phlebitis, (b) through extension of the inflammation by contiguity from the adjacent artery.

"2. Thrombosis. Primary (beginning in infected veins), secondary (interruption of the circulation in the concomitant artery)."

In discussing the symptoms I quote further from my previous article on this subject. "*Symptoms:* The phenomena of incipient gangrene are identical with those of mechanical obstruction of the blood vessels and naturally vary according to the mode of origin. Pain is very pronounced and never absent in extensive vascular obliterations such as lead to peripheral gangrene. In milder cases only a rise in temperature will indicate some slight infection. The mode of onset of the gangrenous symptoms will sometimes, though rarely, suggest the cause and seat of the vascular obstruction. A sudden onset usually points to embolism in the arterial system (dry gangrene) while on the other hand the gangrene may develop very insidiously in the case of a small embolus. The onset of gangrene may be abrupt or gradual also in cases of purely venous obstruction (moist gangrene) so that the rapidity of evolution of the symptoms permits only an uncertain conclusion as to the seat and origin of the obstacle.

"In a general practical way it may be said that the early appearance of gangrene in the first few days of the puerperium or after gynecologic operations points to an arterial (the most common) origin."

Prognosis.—The prognosis in pronounced cases is governed by the timely performance of embolectomy, or as a last resort amputation. While the mortality is still deplorably high it has nevertheless been lessened by one-half since the institution of modern methods of treatment. Whenever the diagnosis of embolus of any of the large vessels is made, no time should be lost in the prompt performance of embolectomy. Key has published an illuminating article on this subject and he reports a number of cases where the timely performance of embolectomy has saved the patient's life. The sooner this operation follows the typical signs of complete occlusion of the affected vessel, the better are the patient's chances. The first twenty-four hours after the onset of the symptoms apparently offers the best results.

Where however embolectomy fails of the desired result, it must be decided in each individual case whether the well-known conservative measures will suffice or amputation of the affected limb is rendered imperative.

Prophylaxis of Embolism.—In the presence of a preliminary thrombosis, the prevention of embolism consists in the treatment of the throm-

bosis, whose onset is to be regarded up to a certain degree as a favorable symptom, in so far as there is a better possibility of guarding against embolism when this eventual danger is understood and realized. Although it is true that embolisms occur in only a small proportion of earlier thromboses, they are noted in about one-fifth to one-tenth of the cases of severe femoral thrombosis. In the absence of external thrombotic manifestations, the difficulties of prophylaxis are greatly increased. Major gynecologic operations such as myomectomy, total hysterectomy, removal of ovarian tumors, etc. always involve a certain risk of subsequent thrombosis. However, a thorough and forcible examination in order to discover an eventual thrombosis is contraindicated for the reason that the necessary manipulations may cause the detachment of a thrombus with an outcome of embolism and obstruction of the blood supply in the affected extremity. Such investigations should therefore be omitted and instead, helpful prophylactic measures should be instituted such as early moving of limbs, getting up out of bed as promptly as is reasonable after operations on the pelvic organs and the judicious administration of heart tonics before and after the surgical interference.

The lodging place of an embolus is governed by its size, while the onset or nonoccurrence of gangrene depends upon the development of a collateral circulation. As the strength of the heart is usually much diminished in these patients, the blood pressure in the peripheral arteries is apt to become greatly lowered, resulting in the formation of so-called stagnation thrombosis. This secondary thrombus, forming in a few hours, blocks the collaterals and unless surgical help comes in time to restore its blood supply the limb is doomed.

In cases of fully developed gangrene, the seat of the causative embolus must be looked for considerably above the line of demarcation. In gangrene of the foot and the lower third of the leg, it is situated in the popliteal artery. In gangrene up to the upper third of the leg, it is situated in the lower part of the femoral artery. In gangrene of the thigh, it is situated in the upper part of the femoral artery or the iliac artery or in the aorta. Obstructions of the aorta, however, do not necessarily lead to gangrene of the lower extremities, as the collateral circulation is more readily established here than lower down, namely by way of the circumflex iliac and lumbar arteries. The seat of the obstructive embolus is usually at the bifurcation of large blood vessels such as the aorta, the common iliac, femoral, popliteal, axillary and the upper portion of the brachial artery. The left side seems to be more susceptible to involvement than the right, due to anatomic peculiarities.

Since my publication on this subject in 1916 there have been some additional cases, reported in the literature, bringing the total number of cases of gangrene of the extremities within the domain of obstetrics and

gynecology on record in the international literature up to eighty-six. The following table presents the figures at a glance:

	Up to 1916	Published since 1916
Puerperal Gangrene (lower extremities)	53	4
Gangrene after Abortion (lower extremities)	3	1
Puerperal Gangrene (upper extremities)	10	1
Gangrene after Abortion (upper extremities)	1	0
Gangrene during Pregnancy	4	0
Gangrene after Gynecologic Operations	5	4 (one of upper extremity)
	76	10

I will now take up briefly the several cases which have been published since 1916. As stated above, four cases of puerperal gangrene of the lower extremities are on record. Two cases which belong to this class have been published by H. Rice.

The first patient, a colored iii-para of thirty-eight years, complained on the eighth day after spontaneous delivery of "sticking pains like pins and needles" in the soles of both feet. On the ninth day the left foot presented small hard tender veins over the dorsum and on the tenth day there was marked cyanosis and coolness of the left foot from the ankle down, edema of the dorsum and a hyperesthetic area one and one-half inches wide from a beginning line of demarcation in the metatarsal region and downward. On the eleventh day the area on the left foot had spread above the ankle and the edema extended to the knee with redness and tenderness as far as the middle of the calf. Evidences of incipient gangrene were also noted in the right foot and leg but the dorsalis pedis artery was still plainly palpable. No pulsation could be felt in the left foot which was black and cold. Under progressive aggravation of the general and local condition the patient died on the twelfth day after delivery. (A diagnosis of scarlet fever had been made on the fifth day after her admission to the hospital on the basis of rash and the presence of tongue and throat conditions.)

Rice's second patient, a iv-para of thirty years, on the ninth day after spontaneous delivery complained of gradually progressive "drawing pains" aggravated by motion, in the lower left shin and outer side of the left ankle. A slightly reddened area two inches in diameter was seen on the anterior surface of the right tibia, just above the ankle. The local condition became more marked on the tenth day and the ecchymotic spots appeared over the external and dorsal surface of the foot and ankle. On the thirteenth day a definite line of demarcation appeared on the left ankle laterally and over the dorsum of the foot with coldness, cyanosis and anesthetic zone below it. Treatment consisted in quick guillotine amputation at the junction of the middle and upper thirds of the left calf.

Penkert's patient was admitted to the hospital on account of puerperal fever twenty days after normal delivery conducted by a midwife. A perineal rupture was immediately sutured by a physician and the stitches were removed on the ninth day. Three days later the patient got up for a short time and on lying down again complained of severe pains in the legs and arms. On the twentieth day a piece of retained placenta the size of a plum was removed from the uterus

by hand in the course of a gynecologic examination. The left foot now presented a purplish discoloration beginning about two fingers' width above the ankle. In the course of the following days, moist gangrene of the foot gradually supervened, extending up to about two fingers' width above the malleolar region. Amputation became necessary and was performed just below the middle of the leg (circular amputation in one session). At the same time an abscess was opened in the biceps muscle of the left upper arm from which thick creamy pus escaped. The subsequent history was uneventful and at the time of her discharge from the hospital the patient walked without difficulty with a prosthesis. Two years later she gave birth to a healthy child and got up on the eighth day in good condition. The thrombosis is referred, by the observer, to an embolic infectious endarteritis terminating in peripheral gangrene.

Chesky's patient, a primipara of nineteen years was attacked two days after normal delivery by a high fever and a generalized fine red eruption which disappeared in four or five days. Six days after delivery, symptoms of incipient gangrene supervened in both feet which were swollen, numb and discolored. Four days later when she was first seen by the observer the toes were almost black and beginning to become dry. Swelling extended half way to the knees and there was no definite line of demarcation. Pulsation could not be felt in either dorsalis pedis artery. At the end of a week during which this condition had persisted, the circulation in the feet began to improve but although the cyanosis in the dorsum of the feet subsided, the ends of all the toes became hard and dry, the line of demarcation forming at the distal articulation of each toe. The treatment consisted of removal of the dry gangrenous portion and the patient recovered.

The three cases of peripheral gangrene following abortion are supplemented by Knipe's observation on an illustrative and very instructive case in a septic patient:

This observation concerned a Russian woman thirty years of age with gangrene of the right foot and leg following septic abortion (third month). The condition started as a thrombophlebitis of the right broad ligament and involved the inferior vena cava, both common iliac veins, both external iliac veins and the femoral vein on the right side. There was no arterial involvement. Gangrene, first dry and then moist, spread from the toes and involved the entire foot and lower fourth of leg. A line of demarcation formed in the leg within sixteen days after the onset of pain due to incipient gangrene, about two and one-half weeks after attempting abortion. Death from purulent peritonitis.

Four additions can be made to the group of cases of peripheral gangrene following gynecologic operations: Delacroix reported a case which was operated upon by Cirio and concerned a woman thirty-five years of age who died from gangrene of the lower extremities seventy-three days after an abdominal operation (subtotal abdominal hysterectomy for left sided intraligamentous uterine fibroma with bilateral adnexitis). The patient left the hospital about six weeks after operation but returned at the end of a month in very bad condition with gangrenous lesions of both feet. Examination showed a necrotic patch about 10 by 18 cm. in size on the left foot and a similar gangrenous spot about half that size on the right foot. She died six days after admission but no autopsy was permitted. This case is presumably to be interpreted as gangrene from arterial thrombosis as indicated by its evolution and symmetrical behavior. The latter can be explained only on the basis of ascending thrombosis of the uterine artery which is divided in all hysterectomies thus presenting an entrance avenue for the infection with subsequent clot formation and obstruction of the common iliac artery on one side. From the common iliac the thrombosis continued upward and extended to the aortic bifurcation where it evidently occluded the trunk of the common iliac

artery on the opposite side resulting in the production of a symmetrical gangrene.

E. Key's patient was a woman of forty-three years with organic heart disease of ten years' standing who entered the hospital for the interruption of pregnancy in the fifth month of her ninth pregnancy. An exploratory laparotomy was done three days later on account of obscure abdominal disturbances but the cause of same was not discovered. At the end of eight days the right leg very suddenly became cold and pale, the toes and foot could not be moved. Pulsation was palpable in the common femoral artery but not below it. The diagnosis of embolism was rendered and embolectomy was performed two hours after the onset of symptoms. The common femoral artery was exposed and incised at the upper end of the embolus which was so soft and friable that it had to be removed piecemeal with a spoon. Another embolic mass was removed in the same way from the femoralis propria. The foot and leg became warm and the circulation was reestablished four hours after the onset of symptoms. On the following day however the operation had to be repeated on account of the recurrence of the same condition on the other side with the appearance of a purplish spot on the dorsum of the left foot. The popliteal artery was cleared of thrombi and closed by suture but this embolectomy proved less successful than the first and five days later gangrene of the left foot supervened and the thigh had to be amputated. The patient gradually recovered and was discharged about four months later.

In P. Bull's case the woman, sixty-five years of age, on the fourth day following a minor gynecologic operation suddenly noticed pallor, coldness and anesthesia of the left hand and forearm with difficulty of movement. Flexion and extension were possible but no pronation or supination. The forearm and part of the upper arm were discolored and presented bluish spots. Radial pulsation was absent. On the tenth day after the operation the patient died and at the autopsy the left arm from the elbow to the finger tips was found to be yellowish brown, dry, shrivelled and mummified. The left subclavian artery for a distance of 10 cm. from its beginning was filled with yellowish white thrombi which extended through the brachial artery filling it with softened, grayish white, thrombotic masses.

My own case to be reported here is as follows:—The patient was referred to me by Dr. Galambos of this city on March 13, 1924, and her history was as follows: Although fifty-three years of age she had had no menopause but for a year and a half had had marked hemorrhages which would last three weeks at a time and which were accompanied by pain. She had not lost in weight. The patient's blood pressure was 150 to 160. Her history was otherwise unimportant. She had had three children, no miscarriages. The urine was normal. Bowel movement and urination were also normal.

A general examination revealed the heart and kidneys to be normal. A large tumor was to be felt through the abdominal walls. Vaginal examination showed the uterus to be transformed into a hard irregular mass about the size of a child's head. The parametria seemed free. An operation was recommended and was performed two days later on March 15 as follows (at Lenox Hill Hospital):

"Longitudinal incision. The tumor is found to be a multiple fibroid the size of a man's head and easily movable. A supravaginal amputation is performed with removal of both ovaries and tubes. The cervical stump is then covered with peritoneum. The appendix is found to be retrocecal and reaches up to region of the liver. Its removal is difficult. The stump is cauterized with Paquelin but not inverted. The abdomen is then closed in four layers. Operative procedure—supravaginal hysterectomy, double salpingooophorectomy, appendectomy. The different myomatous tumors are cut open and no signs of malignant degeneration are found. (These findings are corroborated by the microscopic examination.)"

During the next five days the patient presented no alarming symptoms. The highest temperature was on the third day after operation 100.6° with pulse of 110 but two days later (March 20) both had dropped to normal.

On March 21, at 2:00 A.M., the patient was suddenly seized with terrific pains in the whole left leg, accompanied by complete pallor, coldness and anesthesia of same. When the patient was seen by me at 8:00 A.M. she was still in extreme pain making the administration of morphine necessary. There was a slight pulsation over the left femoral artery down to about three fingers below Poupart's ligament. The whole leg was cold and presented areas of purplish blue discoloration, rather marked below the knee and in a lesser degree above it and extending up to about four fingers below Poupart's ligament. The left foot was wax-like in appearance. While there was a slight motility of the left leg there was no sensibility. (Needle pricks were not perceived.) A diagnosis of embolus of the left femoral artery was made.

At 3:30 P.M. a consultation with Dr. De Witt Stetten of this city was held. The patient at this time gave the impression of being in good general condition. There was a marked pallor of the foot and a complete loss of power of the lower extremity from the knee down. The skin was mottled around the knee and calf with a definitely parchment-like appearance and feeling on the outer side of the calf. Infiltration (rigor mortis) of the muscles of the calf and lower part of the thigh was present. Complete anesthesia and analgesia from middle of thigh down. Line of demarcation fairly definite through middle of thigh. No femoral pulse palpable. Abdomen soft and sensitive. Vaginal examination showed distinct internal iliac pulse palpable on right side but apparently none on left. No exudate in pelvis. Temperature 99°. Pulse 100, and of good quality.

At 5:30 P.M. femoral pulse was distinctly felt although it was more feeble than on the right side. A provisional diagnosis of embolus of the left femoral artery in the upper portion, probably at point of origin of profunda femoris, was made, with impending gangrene of the left lower extremity and at 8:30 P.M. an arteriotomy with embolectomy was performed under nitrous oxide-ether anesthesia as follows:—

Long oblique incision over anterior surface of thigh. Some edema of the perivascular structures was found. No pulsation in artery from upper portion down as far as Hunter's canal. The artery was soft, not rigid, and apparently filled with a soft clot. The vein was not thrombosed. Fair pulsation was to be noted in upper part of common femoral artery just below Poupart's ligament.

Embolectomy (Drs. De Witt Stetten and Stein). Compression of the pulsating portion of the femoral artery with Carrel clamp. Longitudinal incision into artery in lower portion of Scarpa's triangle. Withdrawal from below of a long, soft, red thrombus about two inches in length. Expression by gentle massage from below upward of several smaller clots and irrigation of artery below incision with saline solution until the entire artery from point of incision to Hunter's canal was cleared. Arterial wall noted to be rather soft and intima smooth. Removal of Carrel clamp and probing of portion of artery above incision with withdrawal of several whiter, firmer and more organized thrombi until the upper portion of the artery has been cleared and there is a free spurting of arterial blood. Re-application of Carrell clamp and suture of incision in artery by fine arterial suture of silk soaked in paraffin oil. No ulceration to be noted at point of suture before or after completion of same. Re-opening of suture again clearing a portion of the vessel above the incision until free spurting of arterial blood was again noted. Re-suture with clamp very lightly applied. After completion of suture no pulsation to be noted at suture or below. No bleeding from suture line. Fair pulsa-

tion above point of incision. Further attempt to restore circulation deemed useless. Fascial suture with continuous catgut was made and skin sutured with interrupted silkworm-gut.

On the following day (March 22) the patient's general condition was very satisfactory. The line of demarcation between the vital and devitalized areas seemed to have traveled somewhat further down the thigh. The patient was able to move the thigh muscles thus giving the impression of having some motion in the knee and leg but actually there was no motion from the knee down. Sensation had reappeared a little further down the thigh. The circulation from below the junction of the middle and lower third of the thigh had, if anything, become worse. The mottling of the skin was darker and the parchment-like area on the outer side of the calf had increased in dimensions. (Fig. 1.)

On March 24 the patient's condition was less satisfactory. The discoloration appeared to have advanced upward on the thigh. The entire thigh was much swollen. Evening temperature up to 102°. Pulse between 110 and 120. Abdominal wound had healed by primary union.

On March 25, there was little change in her condition. On the following day temperature was 103°, pulse 120 to 130 and feeble. The entire thigh was markedly discolored, reaching up almost to the groin. Even the left side of the abdomen and gluteal region were somewhat cyanosed. At 5:00 P.M. temperature was 105° and pulse 150. Systolic pressure 70 to 80. No diastolic. At 5:15 P.M. operation by Dr. Stetten as follows:—

Nitrous oxygen anesthesia with intravenous infusion of Ringer's solution with adrenalin. Re-opening of incision around to exposed artery. Ligation of artery and vein as high as possible. No pulsation whatever to be noted in the artery. Lower portion of wound was sloughing. Upper portion still vital although there was very little oozing. *Disarticulation at the hip* was performed with racquet incision using upper portion of old incision as handle of racquet. Externally and posteriorly there was a considerable foul-smelling secretion in the tissues with some gas which escaped on incising through the muscles. There was practically no oozing at all from cut surfaces except from the sciatic nerve although the muscles still appeared viable. The wound was left wide open and packed with gauze. The operation was ten minutes in duration.

CROSS EXAMINATION:—The leg was totally gangrenous almost from the hip down. A foul-smelling, gas-containing secretion had developed in the musculature. Both the artery and vein were completely thrombosed. The old suture of the artery was noted and seemed intact.

From the beginning of the anesthesia the patient was pulseless but after having received about 750 c.c. of the infusion her pulse began to pick up and her color was better. The usual stimulation was administered but the quality of the pulse was not maintained. The patient died at 6:05 P.M. while being transferred from operating table to carriage. *The final diagnosis* was multiple fibromyomata of the uterus and postoperative embolus of the left femoral artery in its upper portion followed by gangrene of the leg and thigh. Death was due to sepsis and postoperative shock.

Unfortunately no autopsy could be obtained. As to the formation of the embolus in this case I would like to submit the following as the most probable cause:—It was noted at the time of operation that all of the vessels, especially the uterine artery, were markedly enlarged and I take it that thrombi formed in the uterine artery, continued backward into the internal iliac artery and from there into the common iliac artery

where the end piece broke off and was carried in the blood stream down into the femoral artery. Without autopsy, I, of course, have no proof of this assumption but it is a more than probable explanation.

However, the practical value of arteriotomy and embolectomy is illustrated without further comment by the remarkable results achieved by means of this modern procedure in many apparently hopeless cases. In Key's tabulation of the results of thirty-six operations performed within twenty-four hours after the onset of embolism the outcome was favorable in sixteen cases, including two cases of embolism at the bifurcation of the aorta. Success can be obtained only, as pointed out by Buerger, when the arterial wall is still undamaged at the site of the embolism and before the dangerous and extensive secondary thrombosis has occurred.

Fig. 1.—Showing gangrene of the left leg, also incision for embolectomy in upper third of thigh.

Technic of Embolectomy.—The removal of an embolus through arteriotomy is designated as embolectomy and the procedure represents a more recent addition to the domain of vascular surgery. The number of these operations performed is still rather limited but the application of this intervention is surely on the increase and its outcome has of late been substantially improved. The technic of suturing the vessels is today so generally well known that I shall touch upon only a few details in reference to it. Dr. Stetten and I in our above referred case used the Carrel technic of suturing, namely very fine needles and silk soaked in paraffin. I think however that this might be supplanted by a solution of sodium-citrate as we know from Lewisohn's well known experiments that this prevents coagulation of the blood. The solution has already been satisfactorily used by Key.

After the artery has been laid bare the pulsating portion of the artery

is clamped with a Carrel clamp. The incision is then made and if possible it is made just above the embolus in order to avoid any further traumatism to the intima of the artery. If however it is difficult to incise above the location of the embolus the incision is made at the site of same. The embolus is then gently removed with a very fine anatomic forceps or a fine pincette. In some instances the embolus breaks off and has to be removed in pieces. A small soft rubber catheter is sometimes inserted and remnants of the embolus may thus be removed by means of irrigation.

It is always advisable to remove the central clamp for a moment or two before sewing up as secondary thrombi may arise centrally to an embolus. In this manner the remainder of an embolus or a newly formed thrombus may be flushed out by the blood stream. Before this is done however another Carrel clamp is applied peripherally in order to prevent the flushing of any part of the embolus or thrombus into the peripheral blood vessels. After the artery has been completely cleared suturing takes place and the clamps are then carefully taken off and a few minutes are given over to watching to ascertain that the circulation has been re-established. If it happens, as in our own case, that immediately after removal of the thrombus new thrombi form and the lumen of the artery is again occluded, the artery should be reopened and these secondary thrombi should be removed. It is to be noted that some cases will render two arteriotomies necessary in different localities while in others it may be necessary to make two incisions within the same locality for the purpose of flushing out the artery through both openings.

The first embolectomy was performed by Ssabanejew in 1895 who did an arteriotomy in the femoral artery for the removal of an embolus. The operation was not successful and the patient's death followed amputation of the affected leg. Since that time many attempts have been made to save the patient's limb or life by means of this procedure and as pioneers in this field, the names of F. Stewart and Murphy must be given prominence although a number of their cases were unsuccessful.

Key stands foremost as having met with the greatest success in this field. In his publication of 1923 he records ten operations of this type by himself upon nine patients (in one case there was an embolus in both legs). In these cases operation was performed from two hours to four days after the appearance of the earliest symptoms. Gangrene followed in only four of these cases. In all of the others the results were good.

The brevity of this list of embolectomies is due partly to the fact that this postpuerperal and postoperative complication is of rare occurrence and partly because the procedure is in its infancy.

The lesson taught by perusal of the published cases is that where there is embolic obstruction of a main artery, embolectomy should be performed as promptly as possible, for it has been shown that the sooner this opera-

tion follows the onset of symptoms the better are its chances for success. While the unsuccessful embolectomies at the present time greatly outnumber the successful ones, the value of this procedure should not be underestimated, for its timely application has brought recovery to a number of patients and in cases of complete obstruction of the larger vessels it offers the only chance of saving the affected limb or perhaps averting a fatal outcome.

REFERENCES

All cases up to 1916 are reported in my previous article, "Puerperal Gangrene of the Extremities," Surgery, Gynecology and Obstetrics, October, 1916. Since that date the following cases of gangrene of the extremities within the domain of gynecology and obstetrics have been published.

Bull, P.: Acta Chirurgica Scandinavica, 1922, liv, 315.
Delacroix, B.: Monograph, Buenos Aires, 1917.
Chesky, V. E.: Surg., Gynec. and Obst., 1924, xxxviii, 72.
Key, E.: Acta Chirurgica Scandinavica, 1922, liv, 339.
Knipe, H. W.: American Journal of Obstetrics, 1917, lxxv, 988.
Penkert, M.: Ztschr. f. Geburtsh. u. Gynäk., 1921-22, lxxxiii, 45.
Rice, H.: Am. Jour. Obst. and Gynec., 1921, ii, 560.

REFERENCES ON EMBOLECTOMY

Bauer: Centralbl. f. Chir., 1913, liv.
Bull, P.: Acta Chir. Scandinav., 1922, liv, 315.
Buerger, L.: Surg., Gynec. and Obst, 1923, xxxvi, 463.
Doberauer: Prag. med. Wchnschr., 1907.
Dreyer: Deutsch. med. Wchnschr., 1914.
Handley, L.: Brit. Med. Jour., 1907, ii.
Hartley, I.: Edinburgh Med. Jour., 1923, xxx, 408.
Hellstrom, N.: Forh. v. nord. Kirurg. foren., 1916, xi.
Hesse, E.: Arch. f. klin. Chir., 1921, cxv.
Ibsen: Hospitalstidende, 1918.
Jianu, J.: Wien. klin. Rundschau, 1913.
Key, E.: Wien. klin. Wchnschr., 1913.
Key, E.: Acta Chir. Scandinav., 1922, liv, 339.
Key, E.: Surg., Gynec. and Obst., 1923, xxxvi, 309.
Konjetzny: Centralbl. f. Chir., 1915.
Lejars: Bull. et mém. Soc. de chir. de Paris, 1911.
Leriche and Morard: Lyon chirurg., 1912.
Lecene: Bull. Soc. anat. de Paris, 1908.
Lundmark, R.: Hygiea, 1915.
Matti: Schweiz. Kors. Bl., 1914.
Michaelsson, E.: Acta Chir. Scandinav., 1922, lv, 427.
Mosny and Dumont: Bull. de l'Acad. de méd., Paris, 1911.
Moynihan: Brit. Med. Jour., 1907, ii.
Neander: Hygiea, 1919.
Nicolaysen, I.: Norsk. Mag. f. Laegevidensk., 1915.
Nicolaysen, I.: Forh. Nord. Kir. Foren., 1916-1919, xi and xii.
Perman, E.: Acta Chir. Scandinav., 1924, lvi, 555.
Proust: Bull. et mém. Soc. de chir. de Paris, 1911.
Pupovac: Wien. klin. Wchnschr., 1913.
Schiassi: Il Policlinico, 1909.
Ssabanejew: Russk. Chir. Arch., 1895.
Stewart, F.: Ann. Surg., 1907, xlvi.
Stewart, F.: Ann. Surg., 1915, lxi.
Sundberg, H.: Hygiea, 1920.
Wideroe: Norsk. Mag. f. Laegevidensk., Kristiania, 1921.
Ziembicki: Bull. et mém. Soc. de Chir. de Paris, 1914, xl, 577.

48 East Seventy-fourth Street. (*For discussion, see p.* 713.)

A NEW AXIS TRACTION HANDLE FOR SOLID BLADE FORCEPS*

By A. H. Bill, A.M., M.D., Cleveland, Ohio

EVERY obstetrician has his favorite type of forceps and becomes familiar with its use. I have, however, seen in the solid blade forceps certain advantages which are not found in the fenestrated

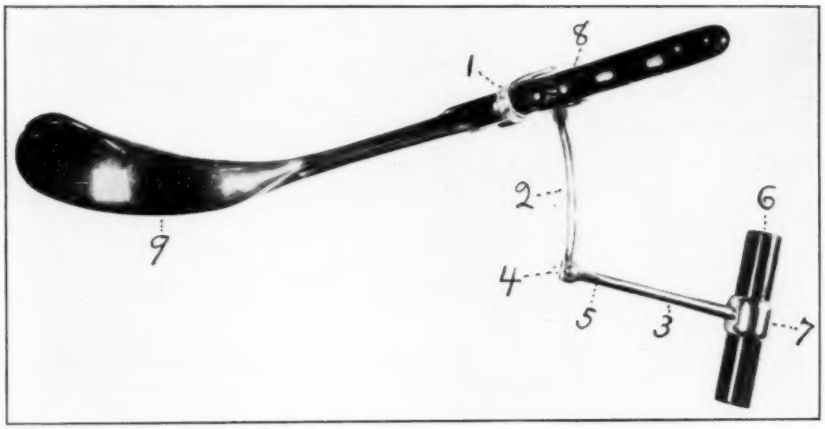

Fig. 1.

instrument. The advantages depend chiefly upon the fact that the thinness and smoothness of the blades make for an easier and there-

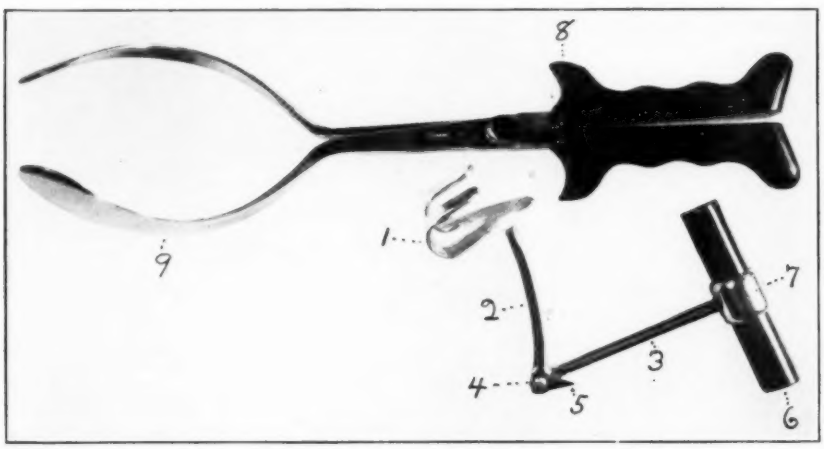

Fig. 2.

fore more accurate application and facilitate rotation in cases of posterior positions. The lack of an axis traction attachment has always

*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

been felt and the present traction handle is offered to complete the equipment of an ideal forceps.

It is unfortunate that axis traction forceps have to such an extent been associated with high forceps work and with the idea of excessive traction force. That is not at all the object of the writer in proposing the new traction handle. The purpose is to increase the accuracy of traction and thereby minimize the force. In fact the writer does not use this instrument in high forceps work but routinely uses it in low and medium forceps cases.

The traction handle (Figs. 1 and 2) consists of a claw (1) which grasps the handles of the forceps (8) very much as two fingers would grasp them in ordinary traction. The vertical rod (2) joins the claw to the horizontal traction rod (3) in a movable joint (4) and is sufficiently long to reach a line drawn through the axis of the forceps blades (9). The indicator (5) points in this line and when traction is made in the proper direction, points in the line of the rod (3). The grip (6) is attached to rod (3) by a movable joint (7) to allow perfect freedom in traction.

To apply the handle it is not necessary to set any screws but simply slip the claw over the forceps handles. It is therefore very easily removed between pulls. The movable joint (4) allows the handles to rise as the head descends and as they do so the indicator (5) shows the direction in which traction should be made.

The traction handle has been in constant use at the Cleveland Maternity Hospital for nearly three years and has been found most satisfactory. With its use and the accuracy of traction thereby made possible, much less force is necessary in delivering a head. It helps us materially in our efforts to reduce traction force to a minimum.[1]

OSBORN BUILDING.

[1]The instrument is made by Tieman and Co., New York.

COMBINED RADIUM THERAPY AND OPERATION IN THE TREATMENT OF CANCER OF THE UTERUS*

By Walter T. Dannreuther, M.D., F.A.C.S., New York

(Associate Professor of Gynecology, New York Post-Graduate Medical School and Hospital)

THE high primary mortality of the abdominal and vaginal radical operations for cancer of the uterus and the disappointingly small percentage of five year cures effected by such heroic surgery, have stimulated the careful investigation of all other methods of treatment which are likely to yield at least as satisfactory results, without subjecting our patients to the risk involved in the Wertheim, Schauta and similar operations. The honesty of purpose of those who create statistics, and then advocate therapeutic measures apparently justified by their figures, is unquestionable, but to delude one's self in matters medical is almost as easy as to mislead others. When one gynecologist of wide experience proclaims that "it is absolutely certain that radium and cautery cannot cure cancer of the cervix," and another equally distinguished worker asserts that "surgery no longer has any place in the treatment of cancer of the cervix," he who reads becomes inclined to reject the statistical tables of both. In consequence of such a wide diversity of opinion, most of us are influenced chiefly by our own observations, with a due regard for the views and practices of others. In view of our present knowledge of the complexities of the cancer problem, no formulation of opinion or deductions from scientific observations, is indicative of a transition from darkness to light. I shall therefore limit myself to a presentation of some recent clinical experiences and pathologic data which have encouraged me to believe that a combination of radium therapy, both preoperative and postoperative, and panhysterectomy, in cases of cancer of the uterus that are not hopelessly advanced, may increase the percentage of five year cures and at the same time diminish the operative mortality. I frankly admit that sufficient time has not yet elapsed to warrant my making dogmatic statements, as the first patient thus treated is just entering her third postoperative year. Hence, this paper must be regarded as a preliminary report and an argument.

In 1917, Ewing[1] described the effects of the gamma rays of radium as follows:—"Within from three to five days after the application in the cervical canal of 300 mc. of radium emanation in a platinum tube, there is hyperemia of the tissues, beginning exudation of lymphocytes and polymorphonuclear leucocytes, and

*Read before the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Cleveland, Ohio, September 18-20, 1924.

swelling of all the cells. In the second week the cords of tumor cells present a characteristic appearance. The nuclei are swollen, homogeneous, and hyperchromatic. The cell bodies are enlarged, the cells loosened, hydropic vacuoles appear in the cytoplasm, and fusion giant cells form. In the third week the number of cells is greatly reduced. Many appear to suffer liquefaction necrosis. Others are invaded and mechanically broken up or compressed by lymphocytes and proliferating stroma. From the fourth to the fifth weeks only pyknotic nuclear fragments or an occasional giant cell are visible, or no traces whatever remain. Meantime the stroma has been active and appears to take an important part in the process. Leucocytes become overabundant, the capillaries proliferate actively, and the stroma is transformed into granulation tissue in which numerous new capillaries penetrate and excavate the tumor cell nests. The gathering of leucocytes, lymphocytes, plasma cells, and polyblasts in the later stages of radium reaction may be extremely profuse, and in this respect the reaction is somewhat specific. Eventually the site of the tumor is occupied by granulation tissue from which slight serous and cellular exudate is discharged. Later, epithelium grows over the denuded surface thus completing the repair."

Ewing has recently stated that further observations have not caused him to modify this description of the histopathologic alterations. The clinical interpretation of this terse and enlightening summary implies: (1) active hyperemia for several days after the application of radium; (2) disintegration of individual cells in direct proportion to the nuclear material present in the cell, mitotic cells being from four to seven times as susceptible as normal cells; (3) "sickening" of many cancer cells not immediately destroyed; (4) the sudden addition of nitrogenous waste products to the blood stream; and (5) fibrosis replacing the malignant growth, after the lapse of several weeks. Assuming these premises to be correct, the biologic changes explain: (1) transitory increase of bleeding, immediately following the application of radium, and why operations within a few days thereafter are attended by unusual technical difficulties, such as free bleeding and tissue friability; (2) why sarcoma is more amenable than carcinoma to radium therapy; (3) why radium therapy sometimes cures cancer, and why there is less likelihood of scattering cancer cells during an operation after preoperative radium treatment than otherwise; (4) why the patients with advanced and recurrent carcinoma, with greatly impaired metabolic capabilities die soon after intensive radium therapy, and why it is so necessary to adapt the dose of radium to the patient as well as to the growth; and (5) why operations should be postponed until at least three weeks have elapsed since the last radium application.

The radium therapy technic that I have followed conforms in large part with the ideas advanced a few years ago by the late Dr. George Stuart Willis, formerly director of radium therapy at the New York Post-Graduate Medical School and Hospital. It has always seemed to me that preliminary estimation of the patient's metabolic capabilities, represented by the blood chemistry, hematopoietic potentialities, cardiovascular integrity, and renal function is as important before radium therapy as before prolonged anesthesia and operation; and a patient with a high nitrogenous blood retention, or pronounced anemia, or greatly impaired renal function, is no more a candidate for the one than the other.

These facts have been verified by Henry Schmitz,[2] who has demonstrated that the increased absorption of autolytic products, incident to radium therapy, is responsible for a pronounced increase in the nonprotein nitrogen and urea nitrogen of the blood. As a result of his chemical and serum examinations of the blood of carcinoma patients with extensive and necrotic cancer tumors, he goes so far as to conclude that "patients with advanced carcinomata should not be subjected to radium therapy." However, gentle stimulation of the emunctories, blood transfusion, physical rest, a high calorie diet, and the treatment of existing heart lesions, hypertension, and nephritis, all augment the patient's vital resistance and recuperative powers, so that at a later period the blood stream may tolerate and the kidneys eliminate the excess of nitrogenous waste products.

Clinically, cases of cancer of the uterus may be divided into three groups: (1) those in which the disease is confined to the uterus, and the uterus is mobile; (2) those showing beginning involvement of the parametrium, with restricted uterine mobility; and (3) those with involvement of adjacent structures and uterine immobilization. This paper has no reference to patients coming within the third group.

Preoperative radium treatment has appealed to me because: (1) I have found that many early cases of carcinoma, particularly those of the transitional or cylindrical cell type, are apparently cured by it; (2) even in cases of the epidermoid type, fibrosis replaces a large part of the neoplastic growth; (3) some borderline may be converted into operable cases; (4) there is "sickening" of the cells not destroyed, and therefore less likelihood of dissemination during operative manipulations; (5) it controls bleeding and restricts the malignant process, thus allowing time for building up the patient; and (6) knowing that most of the cancer cells have undergone necrobiosis, the hysterectomy need not be nearly so extensive as the classical Wertheim operation. Anteoperative radium therapy has disappointed some operators because of increased hemorrhage during operation, postoperative pelvic peritonitis, or a sclerosis of the parametrium. The first two untoward effects are due to operating too soon after the last radium application, while the third can be lessened by avoiding vaginal applications in the preoperative treatment, and is of little consequence unless a radical operation is performed. With a more conservative method of extirpation, taking the "short cut" across the parametrium close to the cervix and vagina, as described by Graves,[3] the failure to find lines of cleavage is not so important.

I believe that needles containing one of the salts of radium are superior to emanation seeds. I also believe that it is wiser to use what may be termed a moderate dose in tubes frequently repeated, for the preoperative uterine applications, rather than to use a mas-

sive dose at one sitting; not only because the latter method may result in increasing the patient's toxemia and overtaxing her capacity for elimination, but also because the former procedure sustains a more prolonged round-cell infiltration and stimulates the proliferation of connective tissue fibers to such an extent, that the consequent compression of blood vessels is distinctly more pronounced (Fig. 1). I have therefore adopted the plan of excising a piece of tissue for microscopic examination, performing a diagnostic curettage, and thrusting six 5 mg. platinum needles directly into the diseased area or carcinomatous cervix, in all cases in which the diagnosis of malig-

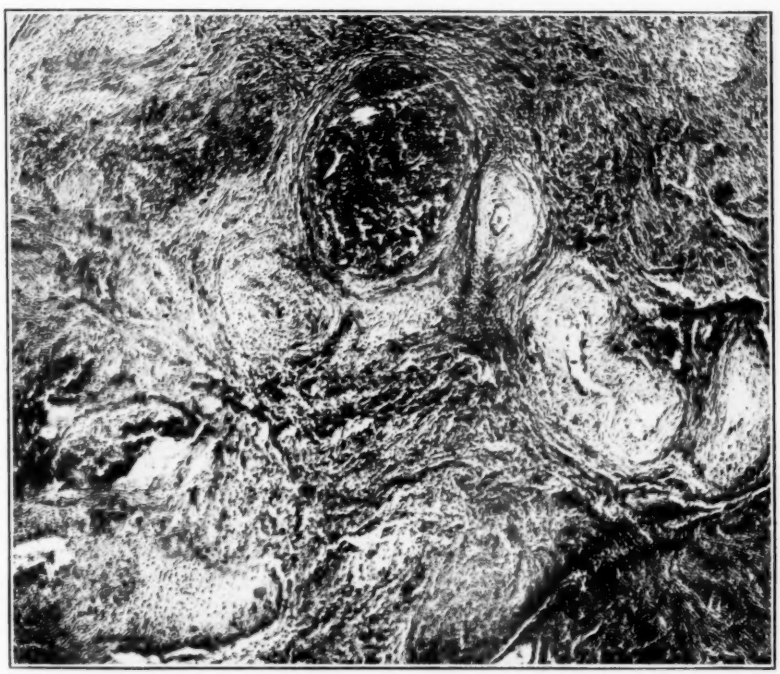

Fig. 1.—Case 37,185. Photomicrograph of section from the cervix, showing tremendous thickening and compression of blood vessels due to the proliferation of connective tissue, after full course of radium treatment. No traces of carcinoma could be found in serial sections from the uterus or parametrium.

nancy is anticipated or has been made (Fig. 2). Any patient who is a proper subject for radium therapy can tolerate this preliminary small dose so that no time need be lost while investigating her physical condition. At the same time, simultaneous biopsy and radium application minimizes the danger of spreading the malignancy by cutting into it. These needles make it possible to distribute the radium rays from the growth itself, produce homogeneous crossfiring over a wide area, will control bleeding in the average case within five days, and constitute a marked advance in radium therapy. They are left *in situ* for twenty-four hours, which makes a dosage of 720 mg. hours.

This is not necessarily sufficient to produce an artificial menopause if the condition is found to be benign, and at the same time is adequate

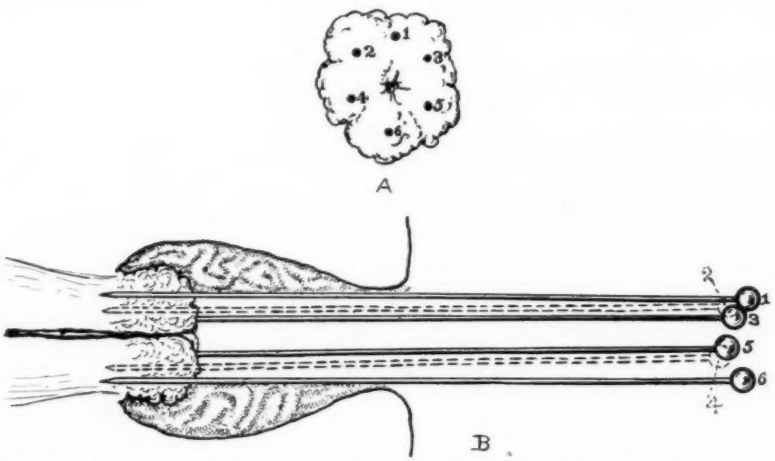

Fig. 2.—*A*, Representation of carcinomatous cervix, showing location of radium needle applicators. *B*, Sagittal view of radium needles thrust into carcinomatous cervix. Vaginal gauze packing surrounding the needles.

in the truly malignant cases to arrest the process for a few days while the patient is being studied.

As soon as the patient's blood components, blood chemistry, and

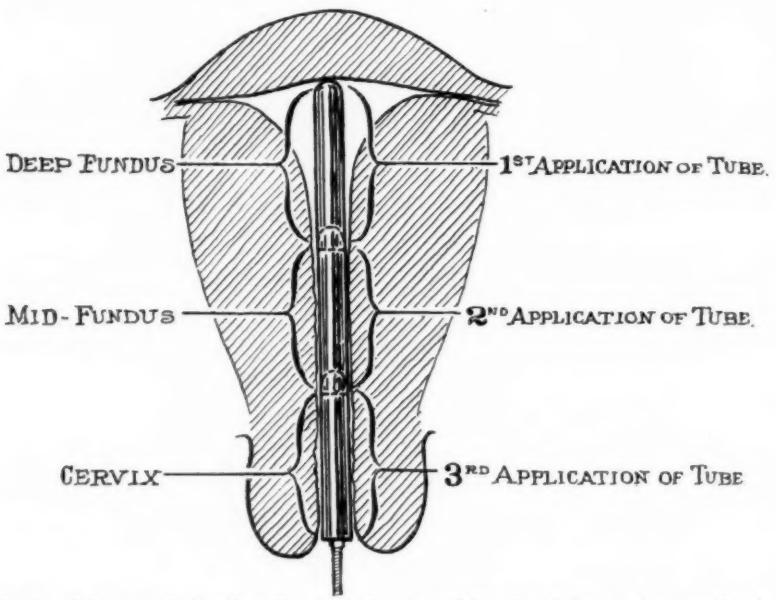

Fig. 3.—Diagram indicating the technic of making the intrauterine applications.

renal function are found to be reasonably near the normal, a 50 mg. tube of radium is placed in the upper limit of the uterine cavity (deep fundus), and left for twenty-four hours. A few days later the same

tube is introduced only so far as the center of the cavity (mid-portion), and left for twenty-four hours. After the lapse of another few days the tube is inserted in the cervix for twenty-four hours. The patient is then dismissed for four or five weeks, when she returns for another twenty-four hour application to the cervix. Examination at this time discloses an improvement in the patient's general physical condition, increased uterine mobility, all traces of malignant disease have practically disappeared from the cervix, and the uterus itself seems atrophied. Since it is impossible to determine accurately the extent of involvement of the endometrium, irradiation of the entire uterine

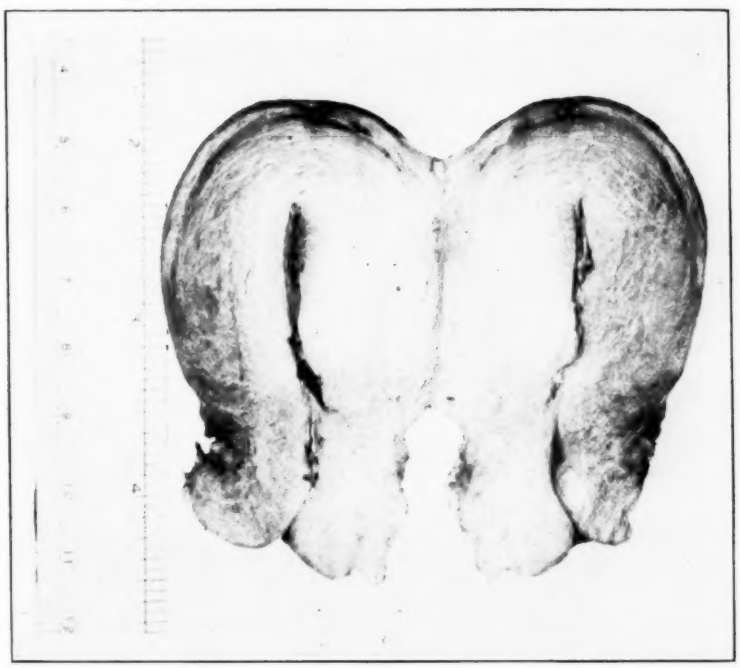

Fig. 4.—Case 28,400. Extirpated uterus after a full course of preoperative radium treatment, showing extensive fibrosis. The obliteration of the cervical canal at the level of the internal os is evident. This was a borderline case when first seen, the cervix being extensively involved and the uterine mobility distinctly limited.

cavity seems desirable. The intrauterine applications are made from above downwards, although it would seem more logical to ray the cervix first (Fig. 3). So much stenosis of the cervical canal, however, may follow the cervical application within a short time, that repeated introduction of the tube may be seriously obstructed (Figs. 4 and 5). Gas-oxygen anesthesia is used for the insertion of the radium needles, but has been found unnecessary in most cases for the subsequent intrauterine treatment. Whenever radium applications are made to the uterus, the vagina is packed firmly with iodoform gauze, to push the bladder and rectum as far away as possible, and constant drainage

of the bladder is maintained through an in-dwelling catheter (Fig. 6). The complete course of preoperative radium treatment amounts to 5520 mg. hours. This technic distributes the dosage over a relatively long period and is used for the average patient, but is not necessarily constant and may be varied according to circumstances. The dosage has been well borne by all patients, has not caused any clinical manifestations of toxemia or uremia, and fistulae have been conspicuous by their absence. It will be noted that applications to the vaginal vault

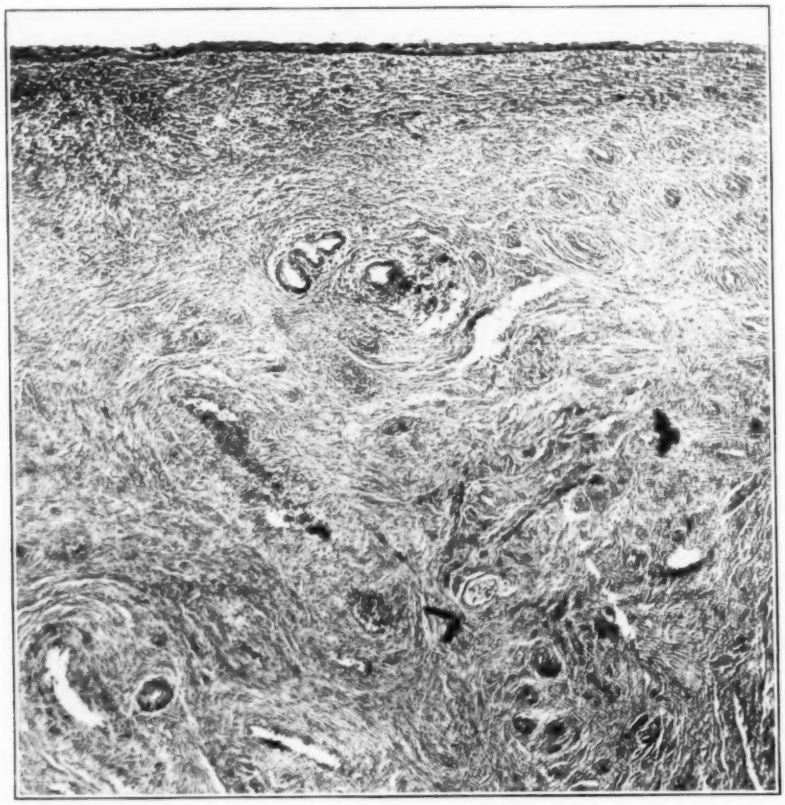

Fig. 5.—Case 28,400. Photomicrograph of section from the cervical canal of the uterus shown in Fig. 4, showing round cell infiltration of the surface and marked atrophy of the mucous membrane.

are not included in the preoperative treatment; they are of course essential in cases where radium therapy exclusively is relied upon for cure.

In several of my cases the effects of the irradiation have been closely followed by taking sections from the same area at the time of each preoperative application. The variations in the tissue reaction observed demonstrate that it is not so much the amount of radiation applied that provokes the response, as the radiosensitiveness of the cells comprising the growth, and the absorptive power of different

carcinomas is not uniform. Squamous cell growths seem to be more resistant than the cylindrical and transitional cell types, and in tumors in which both types of cells are present, the squamous cells predominate long after the basal have disappeared (Figs. 7 and 8). One can therefore never be sure that all the nests of cancer cells have been destroyed, although in many cases there is complete regression of the tumor. This constitutes the first argument in favor of operation. While sections from most of my extirpated specimens show the parametrium to be free from cancer cells after the preoperative therapy,

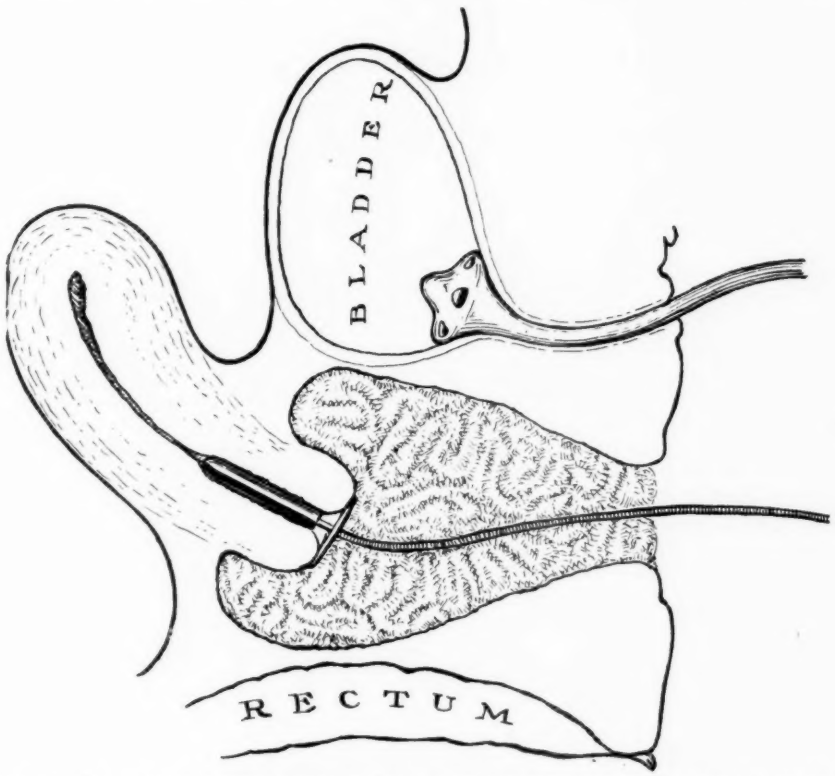

Fig. 6.—The vaginal fornix is packed firmly with iodoform gauze, pushing the bladder and rectum away from the tube. The Pezzer catheter keeps the bladder empty.

the efficient and sufficient dosage of the cellular pelvic tissue is uncertain. A panhysterectomy, from which I have so far had no primary mortality, removes a large bulk of filtering tissue between the radium tube and the parametrium, close to the bony pelvis, and this is another reason for operation. In other words, the postoperative irradiation can reach the parametrium without a large amount of filtration by the uterus and its appendages.

In a recent article,[4] Ewing says, "the results of radiation require some modification of the established theories regarding metastasis in

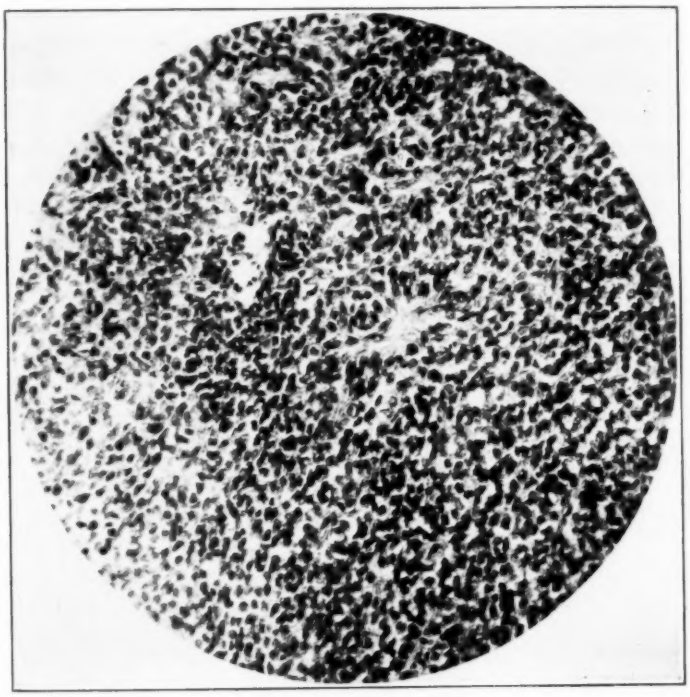

Fig. 7.—Case 42,093. Photomicrograph of biopsy section, showing transitional cell type of carcinoma of the cervix, with bulky spindle cells in the greater part of the tumor.

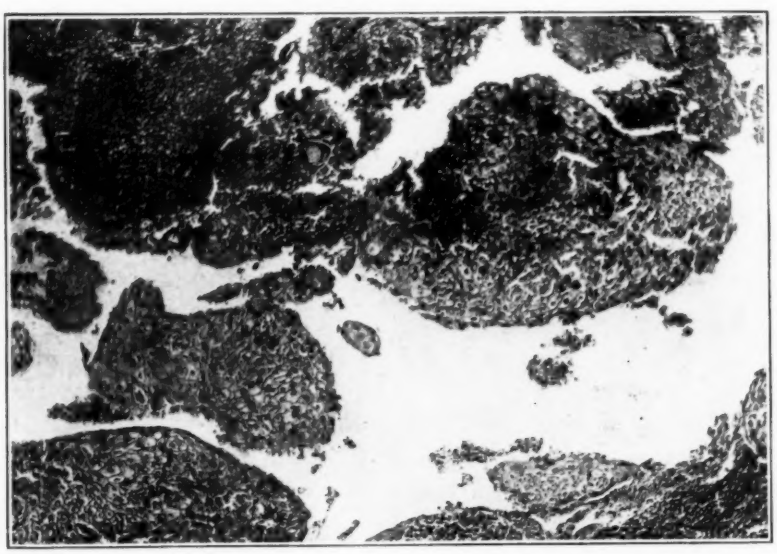

Fig. 8.—Case 42,093. Photomicrograph of specimen taken from same patient as the one in Fig. 7, after two radium applications. The squamous cells are now outstanding and predominant.

certain tumors. The wide sterilizing action of gamma rays seems to take care of the area of permeation, so that in most cases the lymph nodes may be dealt with without block dissection, since the intervening lymphatics are not filled with cancer cells, except in late cases when growth in both directions may have occurred * * * When extirpation and block dissection were the only resources in dealing with infected lymph nodes, the radical surgical procedure was perhaps justified, but with radiation to support surgical extirpation, the outlook for cases with metastases is not so unfavorable, and it seems legitimate to adopt a more conservative plan, which will test the theory of continuous permeation." This seems to corroborate the opinion that I have long held, that, with preliminary radium applications in early cancer of the uterus, a panhysterectomy may be safely substituted for the more dangerous radical operations.

As soon as the line of union in the resected vaginal walls is firm, 50 or 100 mg. of radium is placed in a lead container (closed on the ends and on three sides), directed toward the parametrium, and left for 24 hours. Three months later this treatment is repeated. After another three months have elapsed, the vaginal roof is usually found so atrophied and contracted that it will not accommodate the radium applicator. In such case, 100 mg. of radium or high voltage x-ray is used externally. This crossfiring is carried out again in another three months. During the second and third postoperative years treatments are given every six months.

The histopathologic sections from all my cases have been carefully studied at the Post-Graduate Hospital by Dr. Paul Klemperer, to whom I am under deep obligation for his enthusiastic collaboration. I shall refer to him for the details of the tissue changes that he has observed after radium therapy, the description of the serial sections from the extirpated uteri, and the demonstration of the photomicrographic slides.*

CONCLUSIONS

From my clinical experience, and the histologic examination of several uteri extirpated after radium treatment, the following deductions seem justified:

1. The clinical behavior of cancer of the uterus under the influence of radium radiation can be checked by repeated histopathologic examinations.

2. For diagnostic purposes, it is important to curette the uterus when the first biopsy specimen is taken, to determine the extent of involvement of the endometrium.

3. Preliminary study of the patient's metabolic capabilities and cor-

*See article by Dr. Klemperer, this issue, page 619.

rection of cardiac, renal, and hematogenous abnormalities are essential before intensive radium therapy.

4. All cases of cancer of the uterus should receive full doses of radium. It is a mistake to attempt to modify the dosage according to the histologic type of growth.

5. Treatment of the entire cavity of the uterus from above downward is of paramount importance.

6. Radium treatment should be supplemented by a panhysterectomy, because (1) complete destruction of all cancer cells in all tumors is uncertain, (2) the operation removes a large bulk of filtering tissue between the radium tube and the parametrium, and (3) because of its scientific value. Radical operations are unnecessary after thorough irradiation.

7. Extensive sections of extirpated uteri are a better criterion of cure than the lapse of any particular period of time, although each test is complementary to the other.

8. Postoperative irradiation should be given as a prophylactic against recurrence.

9. Histopathologic data must be added to clinical statistics before the latter are worthy of serious consideration.

REFERENCES

[1]Ewing, James: Jour. Am. Med. Assn., April 28, 1917, p. 1238.
[2]Schmitz, Henry: AMER. JOUR. OBST. AND GYNEC., April, 1924, p. 449.
[3]Graves, William P.: AMER. JOUR. OBST. AND GYNEC., November, 1920, p. 122.
[4]Ewing, James: Canadian Practitioner, March, 1924, p. 95.

580 PARK AVENUE.

(*For discussion, see p.* 711.)

HISTOPATHOLOGIC CHANGES IN UTERINE CARCINOMA TREATED WITH RADIUM*

By Paul Klemperer, M.D., New York, N. Y.

(From the Department of Laboratories, New York Post-Graduate Medical School and Hospital)

THE value of the histologic examination of uterine carcinoma during and after radiation treatment can be considered as twofold. The opportunity to study the material under the immediate influence of radiation has greatly advanced our knowledge of the action of rays on carcinomatous tissue and has contributed new information regarding the natural history of carcinoma. This advance in our knowledge is equally important for the gynecologist engaged in the practical application of radiation as well as for the pathologist devoted to the theoretical problems of tumor growth. Their combined efforts have already led to certain general rules in the radiation treatment. Notwithstanding these conclusions in general, however, the value of repeated histologic examination for each individual case must not be overlooked. The histologic examination during radiation serves as a check upon the efficacy of the treatment and the exact examination at the conclusion of treatment will determine its success, and consequently the prognosis.

My association with Dr. Henry Schmitz in Chicago and Dr. Walter T. Dannreuther in New York has afforded me an unusual opportunity to study the influence of radiation upon the histologic structure of uterine carcinoma. The latest publications of Dr. Schmitz contain the results of the histologic examination of carcinomata treated with combined radium and x-rays, whereas in Dr. Dannreuther's cases only radium was applied. Notwithstanding the pros and cons in regard to the therapeutic value of radium or x-ray or combined application, we know that the morphologic effect of the rays on the carcinoma cells is identical.[1] Since the present study has been concerned only with certain points of the histologic aspects of the radiation problem, we may safely draw our conclusions from both sets of material.

The general influence of radiation on carcinomatous tissue has already been described by so many authors that I may be allowed to restrict myself to a few pictures which exhibit the classical features during ray activity; the changes of the carcinoma cells and the proliferation of the stroma (Figs. 1 and 2).

*Read before the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Cleveland, Ohio, September 18-20, 1924.

The different sensibility of normal and neoplastic cells toward radiation has been the basic principle of its therapeutic application. The observations of the numerous workers in this field have disclosed the fact that various types of tumors differ in their sensibility toward rays. But even apparently identical tumor types do not always react in the same way. To determine the causes of these differences seems to me the most important problem of radiology. Although histologist by education and profession I do not hesitate to confess that the solution of our problem cannot rest with mere morphologic observation. But the histologic analysis might prove helpful in our

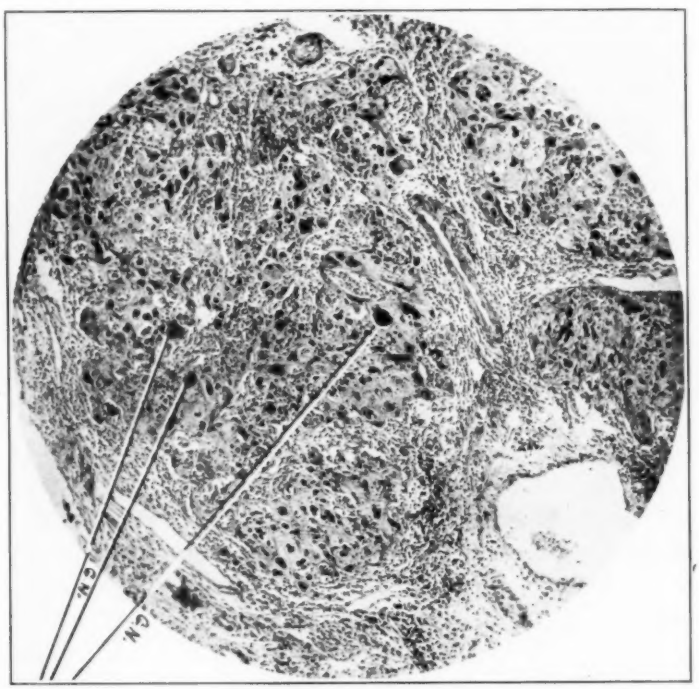

Fig. 1.—Squamous-cell carcinoma of cervix, nine days after first insertion of radium needles. *G.N.*, Giant nuclei.

task and with this viewpoint in mind we have studied the effect of radiation on the different histologic types of uterine carcinoma.

The law of Bergonier and Tribondeau that embryonal cells are more sensitive toward radiation than the adult cell types has been confirmed by one group of authors who investigated the influence of rays on uterine carcinoma. Alter,[2] Ewing[3] and Schmitz[4] have found that the so-called basal-cell carcinoma of the cervix responds much more quickly and better to radiation than the squamous-cell and the cylindrical-cell types. From that observation Schmitz[4] has drawn the practical conclusion that basal-cell carcinoma requires a smaller destructive dose than the adeno and the squamous-cell carcinomata of the

uterus. Other authors, however, have come to opposite conclusions. Adler,[5] for instance, in a review of almost 200 cases emphasizes the fact that the unripe carcinomata are far more resistant than the riper forms. Regaud in a recent lecture takes the same stand. Lahm[6] found that unripe cervical carcinomata require higher doses of radiation than the medium and ripe forms. My own experience formerly agreed rather with the first-mentioned viewpoint, but recent observations have caused me to modify the opinions I had previously. The effect of radiation is determined not only by the tumor type but also by the extension of the growth, the age and general condition of the

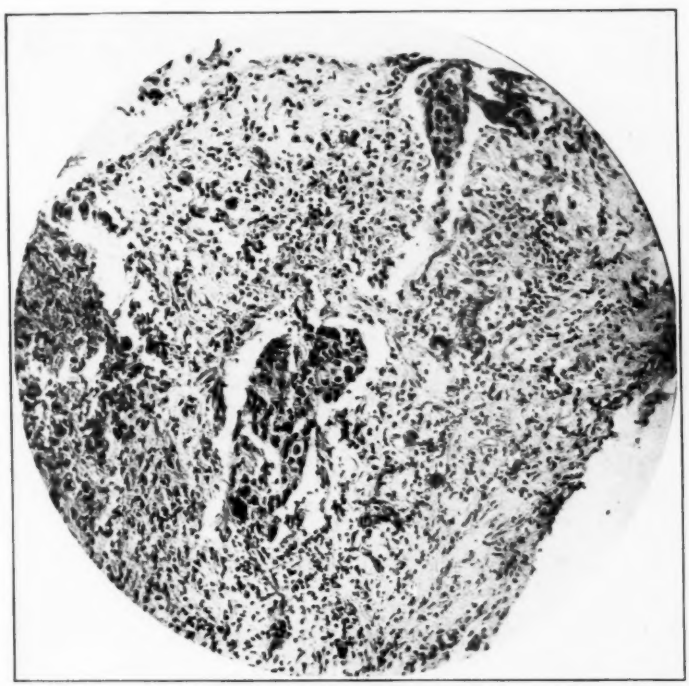

Fig. 2.—The same as Fig. 1. Proliferation of fibrous tissue and lymphocytic infiltration.

patient and the amount of ray application. The number of determining factors makes it difficult to select cases suitable for comparison. This difficulty may account for the great divergency of opinion and it may explain our own somewhat uncertain position.

Notwithstanding these limitations in general, however, certain histologic features of the so-called basal-cell carcinoma of the cervix necessitate further consideration.

In his first publication on basal-cell carcinoma Krompecher[7] mentions carcinoma types which show, besides the classical basal cells, transitional forms toward the true squamous cell. Kermauner and Schottlander, in their classification of cervical carcinoma, use the term

"medium ripe" carcinoma for these transitional forms. Every experienced pathologist knows the cases in which a definite diagnosis as to the exact type can hardly be made. We may distinguish two forms of transitional carcinoma; one in which the cells neither conform with the spindle-shaped cells of the basal-cell type nor with the ripe pavement cell (Fig. 3) and the other in which, besides islands of basal cells, foci of ripe squamous cells are found (Krompecher[8]). Similar pictures can be discovered in every carcinoma originating from the surface pavement epithelium. Yet, not only in these forms, but even in true adenocarcinoma of the corpus uteri, foci of squamous-cell

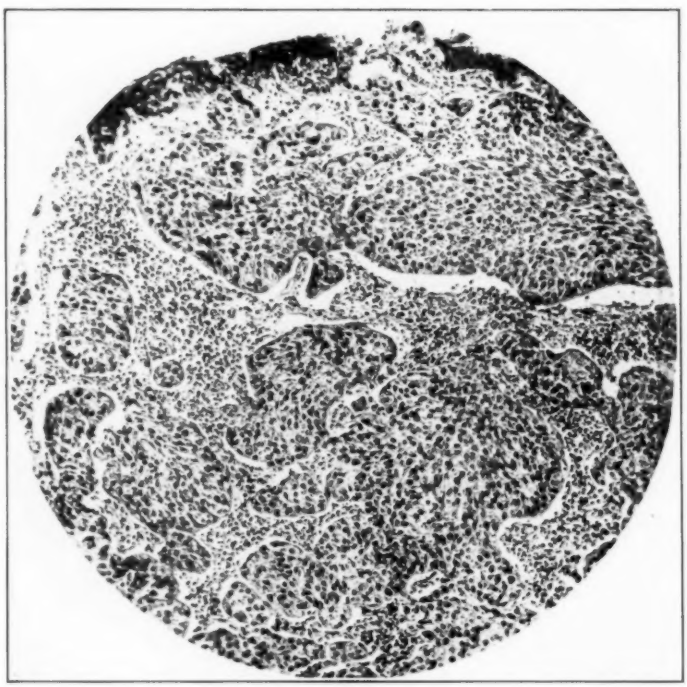

Fig. 3.—Transitional cell carcinoma of cervix before treatment.

cancer are not uncommon (Fig. 4) (Hitschmann,[9] Lahm[10]). Schridde[11] and Aschoff[12] explain this occurrence not as the result of previous metaplasia but by the assumption that the epithelium which initiated the carcinomatous formation differentiates in various directions. These, so to speak, mixed types of carcinoma, are by no means uncommon but they remain sometimes unrecognized if one has failed to examine several different portions of the carcinoma. That will, however, occur as a rule in the histologic examination of biopsy specimens, where only one small piece is submitted for the pathologic analysis.

The difficulty of an unbiased classification of these tumor types is

evident. Schmitz includes the medium ripe with the ripe forms and applies the squamous-cell dose. Adler, however, considers these transitional forms as less resistant than the unripe types. Other observations of my own called for further consideration. In three cases of picture of basal-cell carcinoma (Figs. 5, 6, 7 and 8 in Dr. W. T. Dannreuther's paper, see pages 614 to 616, this issue). Yet a subsequent examination during the treatment revealed the predominance of squamous cells. (Fig. 6.) These pictures permit two ways of explanation. It might be conceived that previous undiscovered squamous cells have survived the radiation which proved destructive for the less resistant basal

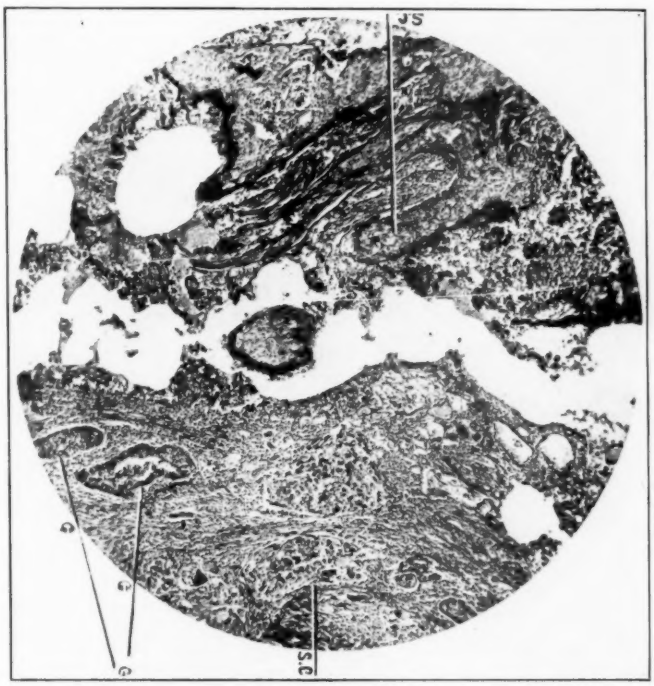

Fig. 4.—Corpus carcinoma. *G.* Irregular glands: *S.C.*, islands of squamous cells.

cells; or we have to consider a transformation of basal cells into squamous cells under the influence of the rays. The latter conception is sustained by the experience of other authors. Aschoff[13] apparently has seen the same transformation in the first cases treated by Kroning and Gauss. He reports three cases of basal-cell carcinoma of the cervix which, during the treatment, changed into hornifying squamous-cell carcinoma. Similar changes have been observed by Oberndorfer,[14] Prym[15] and Haendly.[16] Alter[2] states that radium rays have a very marked accelerating effect on the process of differentiation in the prickle-cell carcinomas. Even the transformation of cylindrical cells into squamous cells has been reported by Oberndorfer, who found the

mucous glands of the esophagus lined by squamous cells after mesothorium treatment. Which explanation of that transformation holds true in any individual case depends on the histologic picture, but the decision might be extremely difficult, even subjective. Whether such a transformation is favorable, as Aschoff maintains, or unfavorable according to the conception of the higher resistance of the squamous cells, I dare not decide.

The foregoing considerations and observations can be briefly summarized, as follows: 1. The question as to the difference in the radiosensibility of the different histologic types of uterine carcinoma is

Fig. 5.—Basal-cell carcinoma of cervix before treatment.

still controversial. 2. The occurrence of transitional types and mixed forms of ripe and unripe cells must be considered. 3. Several observations indicate the occurrence of transformation of unripe into ripe forms during treatment. 4. Histologic examination during the treatment controls the effect of radiation and only by repeated examination can mistakes in the exact diagnosis of the tumor type be avoided.

Two conclusions can be drawn from these considerations: First, the importance of repeated histologic examination during radiation, a procedure which obviously is only possible in case of prolonged treatment. The second suggestion, however, is the application of high unit doses of rays in all cases of uterine carcinoma. The technic of radium

treatment followed by Dannreuther complies with these conclusions and the results of his treatment, which were checked by careful histologic examination of uteri removed after treatment, are very encouraging (Fig. 7).

Another advantage of his method seems to me the application of radium to the entire surface of the endometrium from above downward. Dannreuther and I believe that extension of a cervical carcinoma into the uterine fundus must be assumed until disproved by microscopic examination of scrapings from the cavity, and curettings from the endometrium should always be submitted with the cervical growth for histologic examination. But even in case a painstaking*

Fig. 6.—Same as Fig. 5, insufficiently treated with radium. One treatment with 1800 mg. hours. Compare the type of cells with that of Fig. 5.

examination of the curettings should prove negative it seems justified to treat the entire uterine cavity. For, *a restitutio ad integrum* of the carcinomatous uterus cannot be the aim of our treatment at present and, therefore, it seems advisable to control from the first a possible extension into the uterine fundus. Recently a case has been referred to us by another surgeon in which this precaution had not been taken. It gave full evidence that, as expected, a mere treatment

*We consider the examination of frozen sections of uterine scrapings, which possibly contain very few foci of carcinomatous infiltration, as absolutely unreliable. An exact diagnosis can only be based on the examination of several paraffin or celloidin sections.

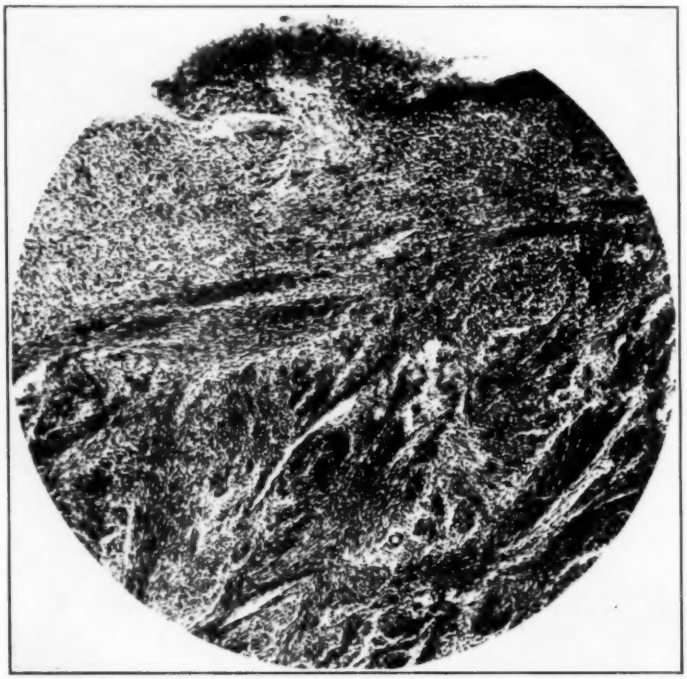

Fig. 7.—Treated transitional carcinoma of the cervix after hysterectomy. Compare Figs. 7 and 8 in Dr. W. T. Dannreuther's paper which illustrate the same case before and during radium treatment. The picture is one of the series of sections from the cervix in none of which tumor cells were found. Lymphocytic infiltration of the surface.

Fig. 8.—Transitional cell carcinoma insufficiently treated with radium. Total, 1850 mg. hours. The cervix did not show changes on gross examination. *Ly. v.*, carcinoma nests in the lymphatics.

of the cervix in case of infiltration of the uterine cavity could not prevent the progress of the carcinoma in the uterine wall.

The last question I want to discuss briefly is the hysterectomy after treatment. It is evident that here the pathologist is only entitled to an opinion and has not the prerogative of making a suggestion. The question can be regarded from two angles; first from the standpoint of the therapeutic usefulness in the individual case, and second, from the viewpoint of scientific value. The first point has been discussed at length by Dannreuther and I want only to add that a definite evaluation of the therapeutic result can only be reached after a painstaking histologic examination of the removed organ. A clinical examination, even the gross study of the uterus, is insufficient. I have one case on record in which an experienced pathologist failed to find any gross changes in the cervix after treatment, which on histologic examination proved to be extensively infiltrated by carcinoma (Fig. 8). The prognosis and the further therapeutic efforts will certainly greatly depend on the results reached by radiation on the primary growth. From this standpoint alone the hysterectomy after treatment seems to be advisable in the interest of the patient. Its importance for scientific research, however, is above any question. Our knowledge of the effect of radium is based on morphologic findings, and we are still far from the day when we can safely dispense with the control of the microscope on the results of radiation treatment. The chief aim of the therapy is the complete eradication of the malignant growth and any new method or new device must be tested by the anatomic evidence, unless we return to the age of speculation in medicine.

REFERENCES

[1]Kurtzahn: Strahlentherapie, 1922, xiii, 72.
[2]Alter: Jour. Med. Research, 1919, xl, 241; ibid, 1920, xli, 439.
[3]Ewing: Radium report of the Memorial Hospital. Sec. Ser., 1923, P. B. Hoeber Inc., N. J., 1924, p. 243.
[4]Schmitz: Am. Jour. of Roentgen. and Radium Therapy, 1923, x, 181.
[5]Adler: Centralbl. f. Gynäk., 1916, xl, 673.
[6]Lahm: Arch. f. Gynäk., 1922, cxvii, 264.
[7]Krompecher: Der Bazalzellen krebs. G. Fischer, Jena, 1903.
[8]Krompecher: Ztschr. f. Geburtsh. u. Gynäk., lxxxi, 299.
[9]Hitschmann: Arch. f. Gynäk., 1903, lix, 629.
[10]Lahm: Arch. f. Gynäk., 1913, cxii, 136.
[11]Schridde: Die ortsfremden Epithelgewebe des Menschen. Sammlung anatomischer und physiologischer Vorträge und Aufsätze, herausgegeben von E. Gaupp und W. Nagel, Jena, G. Fischer, 1909, Heft. 6.
[12]Aschoff: Lehrbuch d. path. Anat., ii, ed. 6, Jena, G. Fischer, 1923, p. 585.
[13]Aschoff: München. med. Wchnschr., 1913, lx, 337.
[14]Oberndorfer: Verh. d. deutschen path. Ges., 17, Tag. p. 295, 1914.
[15]Prym: Handbuch der Röntgentherapie. Lief.V., p. 258 u. 269, Verl. v. D. W. Klinckhardt, Leipzig, 1924.
[16]Haendly: Strahlentherapie, 1921, xii, 1.

(*For discussion, see p.* 711.)

OVARIAN TRANSPLANTATION*

An Experimental Study of Transplantation of Immature Rat Ovaries into Sexually Mature Castrated Rats

By Isidor Kross, M.D., New York

Adjunct Gynecologist, Mt. Sinai Hospital.

(From Columbia University, Institute of Cancer Research, Dr. F. C. Wood, Director.)

THE study of organ transplantation opens up one of the largest and most extensive fields of surgical research. The immense value of the solution of this problem is quite obvious and its application would be truly universal. Much work has been done in this field, and in recent years, owing to the centralization of effort upon the gonads, and owing to the irresponsible and inaccurate claims that have been so frequently made, it is more necessary than ever to attack the subject with methods that can be duplicated in all research laboratories and to present data that can be examined openly and impartially.

For the consummation of a successful graft, several factors come into play. The first and most fundamental one concerns the nutrition of the transplant. This necessitates a technic that will allow for excretion of noxious tissue fluids from the graft and for the reception of nutritive fluids from the host by osmosis, until such time as is necessary to allow for the development of capillaries for the permanent feeding and adoption of the transplant as part of the host proper. No matter how favorable and propitious all other considerations may be, if the technic is faulty to an extent that allows an infection to take place, the graft will succumb. An infection reduces the vitality of the transplant and saturates it and, also to a greater or lesser degree, the tissues of the host with toxins resulting from autolysis of the degenerating tissue. In addition to this, it also interferes with the most vital process of obtaining nourishment from the host by the obstructing wall of leucocytes and dying cells found in the zone of infection.

These two factors, nourishment and asepsis may be considered the mechanical preliminary necessities for a successful graft. They, however, constitute only the initial step towards success. We now come to the far more complicated biochemical and physiologic factors. These do not concern autografts and numerous authentic reports are at hand to prove this. We are familiar with the wonderfully successful transplantation experiments that botanists, i.e., Luther Bur-

*Read at a meeting of the New York Obstetrical Society, January 13, 1925.

bank, etc., have carried out with heterografts. In animals low down in the scale of evolution, there have also been many successful hetero-transplants.[1]

Schoene[2] points out two factors that obtain in plant tissue that do not exist in animal grafts. First the plant graft generally has buds, that contain embryonic tissue capable of independent growth; and, secondly, the plant synthetizes its nutrition from inorganic substances that it draws both from the earth and from the air. The latter factor especially differentiates plant graft from animal graft, as the animal graft is never under any condition an independent self-sustaining body and cannot sustain life from inorganic substances. Schoene concludes (pp. 25, 26) both from his own observations and from those of Ehrlich[3] that the cause of failure in heterografts is due to differences in metabolism resulting in inability on the part of the graft permanently to assimilate the protein-split products of the host and also in the absence of substances within the host necessary for the existence of the graft proper. These metabolic differences are more marked, where the relationship between the two species is more distant, and in this way he explains the varying intervals of time preceding the death of grafts in different species of animals.

For all practical purposes, however, the field of research in transplantation studies concerns the homograft—in other words, the transplantation of tissues and organs from one individual into another, both belonging to the same species. The number of factors involved is so great that the writer in this study limited himself to but two of them, namely, (1) function; (2) growth potentiality. In these experiments laboratory-bred white rats were employed. Young, robust, sexually-mature animals were selected to act as hosts. The ovaries of rats varying in age from one to twelve days were taken for grafts. In order to obtain the largest possible surface for contact with the tissue of the host and thus to allow for the most rapid and most extensive food supply, the ovaries were cut into several small sections with fine sharp scissors, just prior to insertion into a muscular canal that was prepared in the anterior abdominal wall of the host.

Procedure.—The host was anesthetized and prepared for laparotomy by shaving the hair on the anterior abdominal wall. The skin was then painted with tincture of iodine and the peritoneal cavity opened in the midline. The ovaries were now brought into view and excised *in toto*. This was done in such fashion as to make absolutely sure that no ovarian tissue was left behind. After both ovaries had been removed, a fine sharp-pointed, straight scissors was pushed through the peritoneum into the abdominal muscles forming a tunnel about three-quarters of an inch long and one-eighth inch wide. This groove was placed about one-half inch from the abdominal incision and parallel with it. In some animals where two grafts were made, two tunnels were bored, one for each transplant. The host was now fully prepared for the reception of the ovarian graft. The animal that was to be employed as the donor was now anesthetized, the anterior abdominal wall painted

with iodine and the peritoneal cavity opened. The ovary was excised, cut into several small fragments and immediately introduced into the canal already prepared in the anterior abdominal wall of the host. This procedure was followed in this

Fig. 1.

sequence in order to prevent drying and hence injury to the graft. The opening of the groove in the abdominal wall of the host was closed with a fine black silk suture thus marking the site of the graft. The host was sacrificed at varying

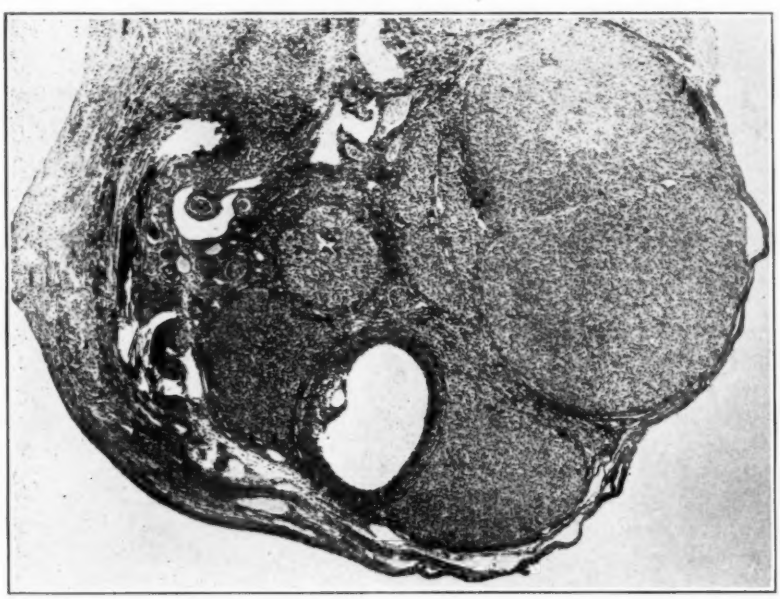

Fig. 2.

intervals of time after the operation and the graft was removed en masse with the surrounding tissue and immediately placed in Zenker's solution. Complete serial sections were made. Eosin and hematoxylin were used to stain the tissue. For

controls, a similar series of experiments were carried out, employing mature rats as donors. The technic was the same in all other respects.

PROTOCOLS

(1) No. 22208. Ovary from rat five days old (Fig. 1). This picture shows a cross section of the ovary, studded with primordial follicles. These consist of the

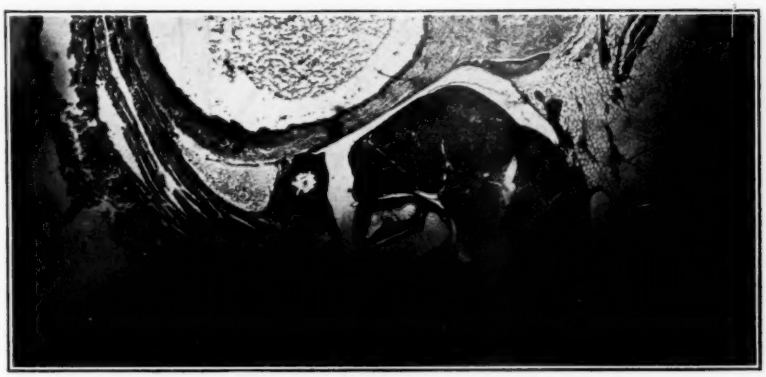

Fig. 3.

immature ovary surrounded by a single layer of epithelial (granulosa) cells. The follicles are so abundant, that practically no stroma tissue is visible.

(2) No. 21798. Ovary from rat three days old at time of removal. Transplanted into mature castrate and removed eight weeks later. Sections from this

Fig. 4.

ovary show the picture of a fully developed normal ovary. There are seen mature normal graafian follicles and corpora lutea of different ages denoting more than one cycle of ovulations. (Fig. 2.)

(3) No. 21996. Ovary taken from rat four days old and implanted into a mature castrate. (Fig. 3.) Removed ten weeks after grafting. Here too the

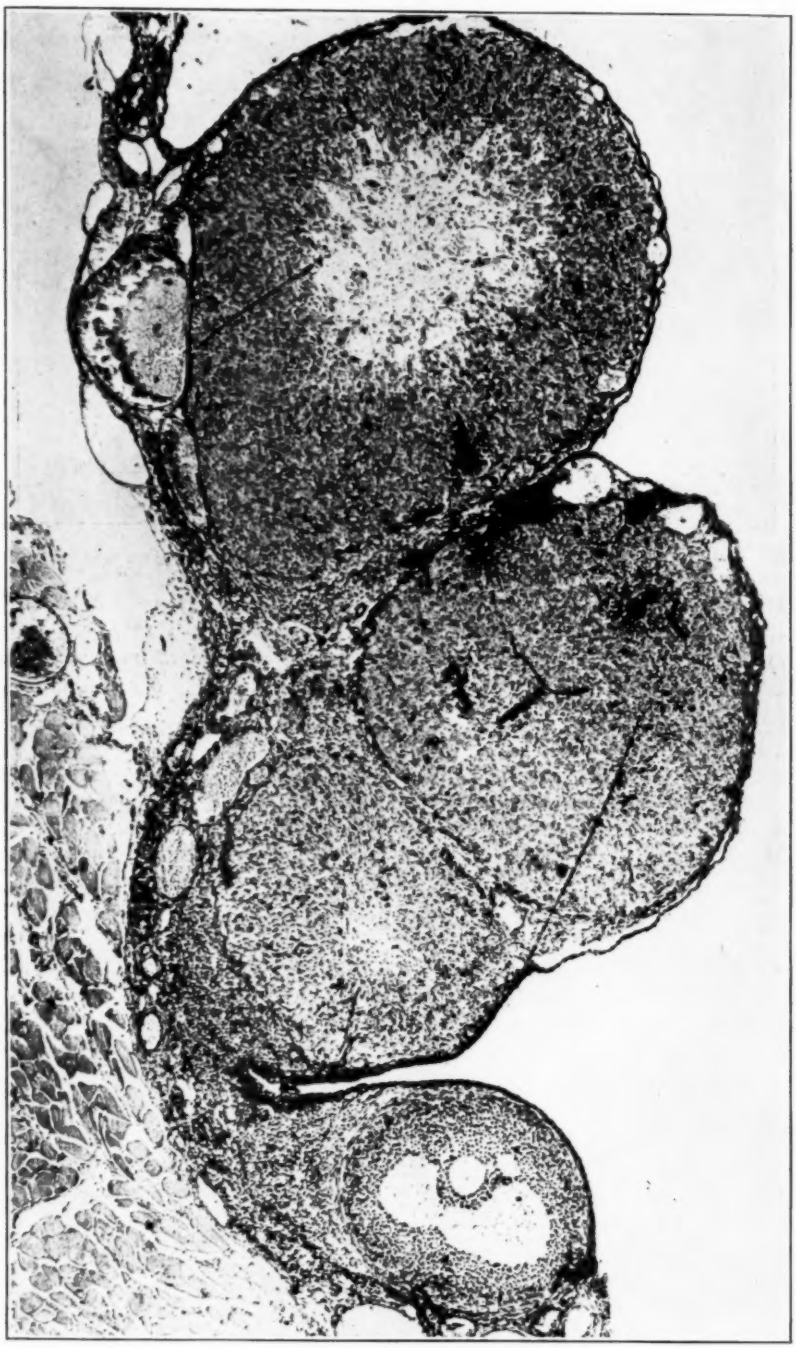

Fig. 5.

microscopic picture is that of a fully developed perfectly normal ovary, showing mature graafian follicles and numerous corpora lutea of various ages, the older ones containing in their centers varying quantities of fibrous connective tissue.

(4) No. 22033. Ovary taken from rat four days old, implanted into a mature castrate and removed twelve weeks after grafting. (Fig. 4.) Here again the microscopic picture shows very clearly and definitely graafian follicles on full maturity and many corpora lutea that are the outcome of successive cycles of ovulation.

(5) No. 22559. Ovary from rat twelve days old, implanted into a mature castrate and removed forty-one weeks after grafting. (Figs. 5 and 6.) This is the most valuable of all the grafts in this series, as it shows the transplanted organ nine and one-half months after the graft had been made, in a state of perfect preservation.

For comparative study, a second series of experiments was performed. In this group, the ovaries were taken from donors that were

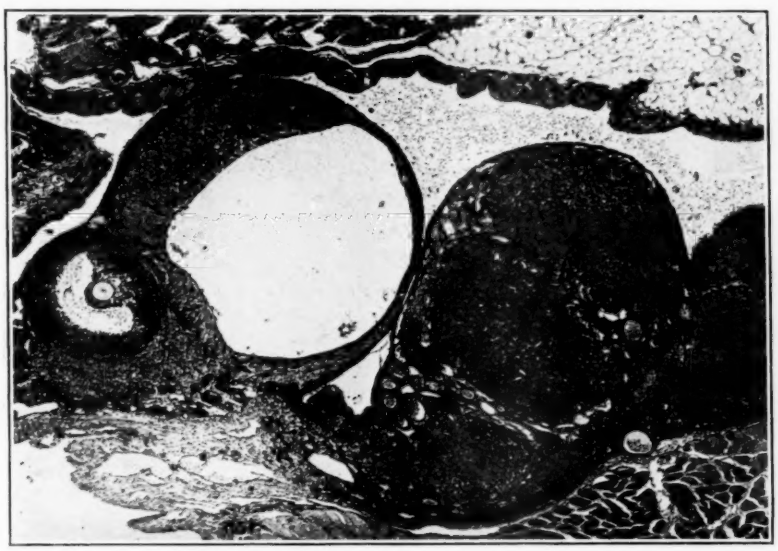

Fig. 6.

mature in contradistinction to those in the first series where the donors were immature, varying in age from three to twelve days. The hosts, as in the first group, were mature castrates.

(6) No. 21779. Ovarian homograft four weeks old. (Fig. 7.) The microscopic picture presents several graafian follicles in an early stage of cystic degeneration, in which the granulosa cells show pycnosis, and in many instances present an indistinct outline. The number of mitoses is distinctly diminished and many of the cells bordering upon the follicle cavity are completely degenerated and numerous others are already desquamated with the cavity proper. In these degenerated follicles, the ova have lost their regular outline and show beginning skeletonization. There is however seen in one place a normal fully developed graafian follicle and a corpus luteum.

(7) No. 21773. Ovarian homograft thirty-three days old. No healthy graafian

follicles are seen. Both the immature and the mature ones in this graft show definite and distinct degeneration. No mitoses were seen in the granulosa cells. The ovum has lost its regularity of outline and the interior shows a homogenous hyaline degeneration. Four corpora lutea of varying ages are seen.

(8) No. 21958. Ovarian homograft nine weeks old. Sections from this transplant show several corpora lutea, some immature graafian follicles and one almost mature one, which is, however, markedly degenerated.

(9) No. 22050. Ovarian homograft twelve weeks old. Here can be seen

Fig. 7.

numerous corpora lutea of different ages. The graafian follicles, with the exception of one, are markedly and decidedly degenerated.

(10) No. 22098. Ovarian homograft fourteen weeks old. The microscopic picture shows several mature graafian follicles. With the exception of the ovum, which shows very early degenerative changes, retraction of the cytoplasm and karyorrhexis of the nucleus, the rest of the follicles are apparently normal. Many corpora lutea are seen. Except for the very early ovular changes, this graft presents an almost normal ovarian picture.

(11) No. 22238. Ovarian homograft twenty-two weeks old. While most of the graafian follicles show cystic degeneration, several fully developed perfectly normal ones are seen. A number of corpora lutea are also to be seen.

(12) No. 22267. Ovarian homograft twenty-four weeks old. Shows definite degeneration and cystic changes in the graafian follicles. A third set of experiments was carried out, to act as a further means of comparison and control. In this series both auto- and homografts were made of mature ovaries in mature noncastrated rats.

(13) No. 20025. Ovarian homograft, seven weeks after implantation. There is very little ovarian tissue to be seen in the serial sections. Several mature graafian follicles present themselves. In these, the granulosa cells are apparently normal. The ova, however, show definite degeneration, the outline is no longer regular but is distinctly scalloped, the ovum proper shows marked skeletonization and the nucleus presents definite karyorrhexis.

(14) No. 20044. Ovarian homograft, eight weeks after implantation. Here too there is very little ovarian tissue left.

For still further comparison, a series of autografts in noncastrates was studied. In these animals one ovary was removed from its normal site and transplanted within a muscle pocket of the abdominal wall. The other ovary was not interfered with.

AUTOGRAFTS IN NONCASTRATES

No. 19954. Four weeks' old autograft. Several graafian follicles fully preserved. One mature graafian follicle seen—granulose cells pycnotic. Many have lost their outline and are represented by darkly staining coarse granules. Follicular cavity contains many desquamated degenerate granulose cells. Numbers absent. Several fairly large tubal cysts seen.

No. 19996. Seven weeks' autograft. Very little ovarian tissue is seen in the sections taken from this transplant. The stroma is well preserved and shows no evidence of degeneration. The parenchymatous tissue is markedly degenerated. The granulose cells are pycnotic broken down into coarse granular bodies. The ovum present in one follicle has undergone hyaline degeneration. The follicular cavity contains many broken down granulose cells.

No. 20075. Ten weeks' autograft. Same as No. 19996.

No. 20066. Eleven weeks' autograft. Shows healthy stroma tissue, cystic graafian follicle in which the granulose cells are fully degenerated, showing pycnotic coarse granular degeneration. There are also seen a fibrotic corpus luteum and several tubal epithelial cysts.

No. 20938. Forty-five weeks' old autograft. One fibrotic corpus luteum is to be seen. There is also seen an almost mature graafian follicle, in which the granulose cells are in perfect preservation. The ovum, however, has lost its regular outline and become irregularly scalloped. The body proper of the ovum has become skeletonized and the general center is missing. N. B. The unoperated ovary in this animal is markedly hypertrophied to easily twice the usual size.

In comparing the results of the transplants in the three groups described, the outstanding factor is the practically perfect preservation of the young immature ovaries that were employed as homografts.

It is interesting to note that Neuhof in discussing the relationship

between function and fate of transplants says, "The question is as yet in a very unsettled state. * * * Halstead described persistent functional activity in autotransplants of parathyroids, when the remaining ones were removed and early disappearance of the transplants when the remaining ones were left in place. At the other extreme are those who believe that the rôle of function has no bearing on the fate of the transplant. As an example of this is the work of Gudet, who transplanted whole joints into the soft parts and found them to persist as such even when there was evidently no function to perform. * * * Therefore it may be concluded that the response of the host to a transplant does not depend essentially on function."

It is not so much the intention of the writer to analyze the investigation of Gudet and others, as it is to present evidence that has a specific bearing upon this question. The fact that homografts in castrates show a far greater degree of preservation than do similar homografts in noncastrates can be explained most readily, and in the opinion of the writer most rationally, on the ground of functional demand. The more favorable state of preservation of the homografts in the noncastrates, in comparison with those of the autografts surely cannot be explained on any other ground especially when one takes into consideration the fact that biologically everything is in favor of the autograft.

As for the value of growth potentiality, the state of preservation and of development of the grafts in the first series,—young, immature organs,— speaks obviously and irrefutably for the fact that successful outcome of tissue or organ transplant varies directly with the property of growth potentiality.

The writer, in conclusion, offers the following suggestion as a clinical application of this animal experimental work: Wherever there is an indication for ovarian grafting, as in congenital absence or hypoplasia of the internal genitalia, bilateral castration in young women, etc., better results might be obtained by using healthy, young, immature ovaries.

REFERENCES

[1]Harms, W.: Zoolog. Anzeig., 1910, xxxvi, 145, 1911, xxxvii, 225. Joest, E.: Arch. f. Entwicklungsmechn. d. Organ., 1897, v, 419.
[2]Schoene, G.: Die heteroplastische und homoplastische Transplantationen, Berlin, 1912, pp. 25, 26.
[3]Ehrlich: Ztschr. f. Krebsforschung, 1907, v, 59.
[4]Neuhof, H.: Transplantation of Tissues, New York, 1913.

20 WEST FIFTIETH STREET.

(*For discussion, see p. 715.*)

END-RESULTS WITH THE EMMET-BALDWIN OPERATION FOR PROCIDENTIA*

By Gordon Gibson, M.D., Brooklyn, N. Y.

IN 1894, the late Dr. L. Grant Baldwin, of Brooklyn, modified and perfected the Sims-Emmet operation for procidentia. He obtained astonishing results with this procedure, which those of us who were fortunate enough to be associated with him called the Baldwin operation.

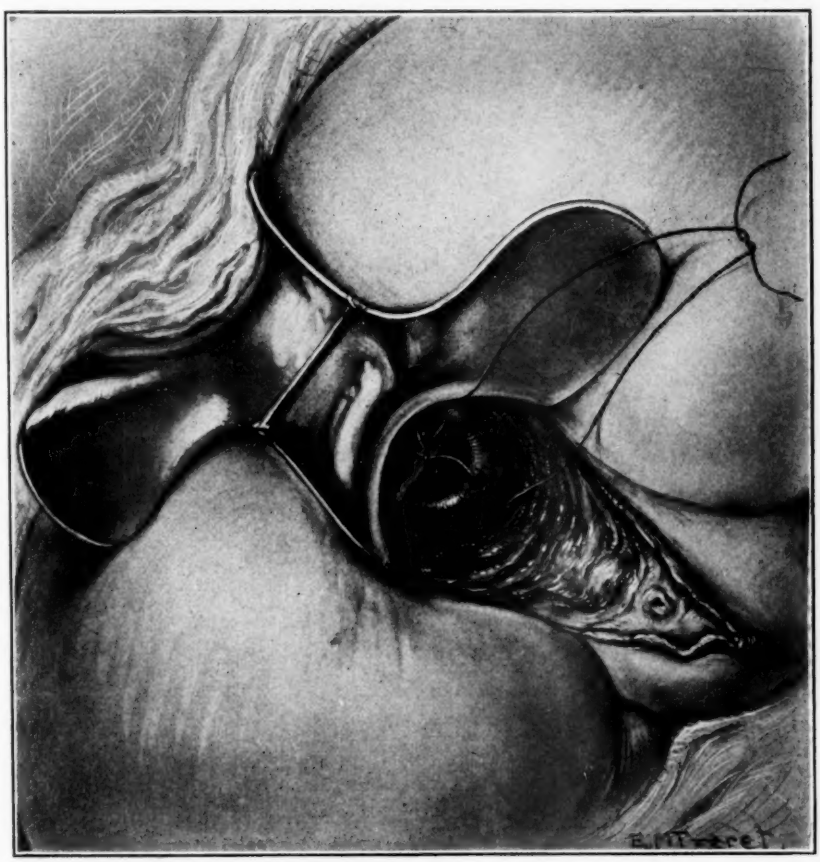

Fig. 1.

I think it is generally accepted that the uterus is held in its position in the pelvis by the pelvic fascia, and that procidentia is the result of a lesion of this fascia. Whether this lesion is a separation of, a

*Read at a meeting of the New York Obstetrical Society, February 10, 1925.

stretching, or a rupture of the fibers makes very little difference—the result is the same, a descent of the uterus. This descent is associated, in the majority of cases, with a cystocele which in itself is due to a lesion of that part of the pelvic fascia known as the vesicovaginal fascia, and with a rectocele which is the result of a separation of the levators from the anterior and lateral walls of the rectum, and a lesion of the rectovaginal fascia, a derivative of the pelvic fascia.

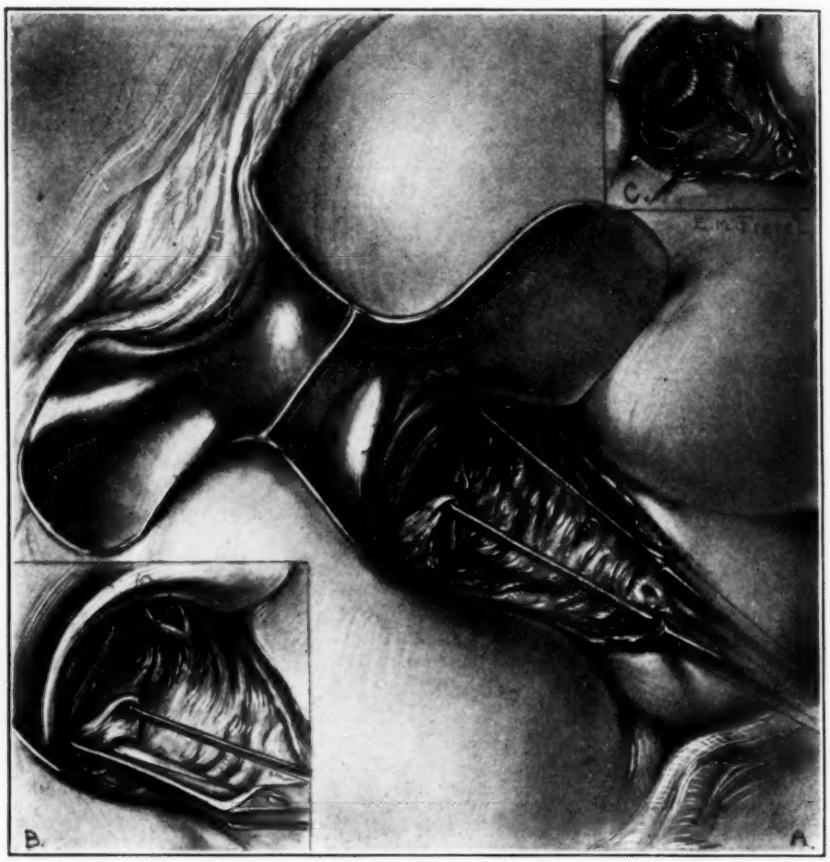

Fig. 2.

Assuming the above to be correct, the obvious method for the cure of procidentia would be to "take up the slack," so to speak, of the pelvic fascia. This is done in the Baldwin operation by bringing the lateral expansions of the pelvic fascia in front of the cervix and attaching them together and to the anterior surface of the cervix.

The operation is done with the patient in the Sims position because with this position the anterior vaginal wall spreads itself out and the cervix falls into the hollow of the sacrum where it is to be maintained. A Cleveland self-retaining speculum is introduced with a strand of

catgut, with long ends tied into the fenestrum in the end of the vaginal blade. Generally, the cervix is large and hyperplastic and is amputated. The stump of the cervix is now sutured to the end of the vaginal blade of the speculum, using the strand of gut previously tied in the fenestrum (Fig. 1). This holds the cervix well back in the position it will have when the operation is completed. A deep sulcus is now apparent on each side of the cervix. Two points are selected, one

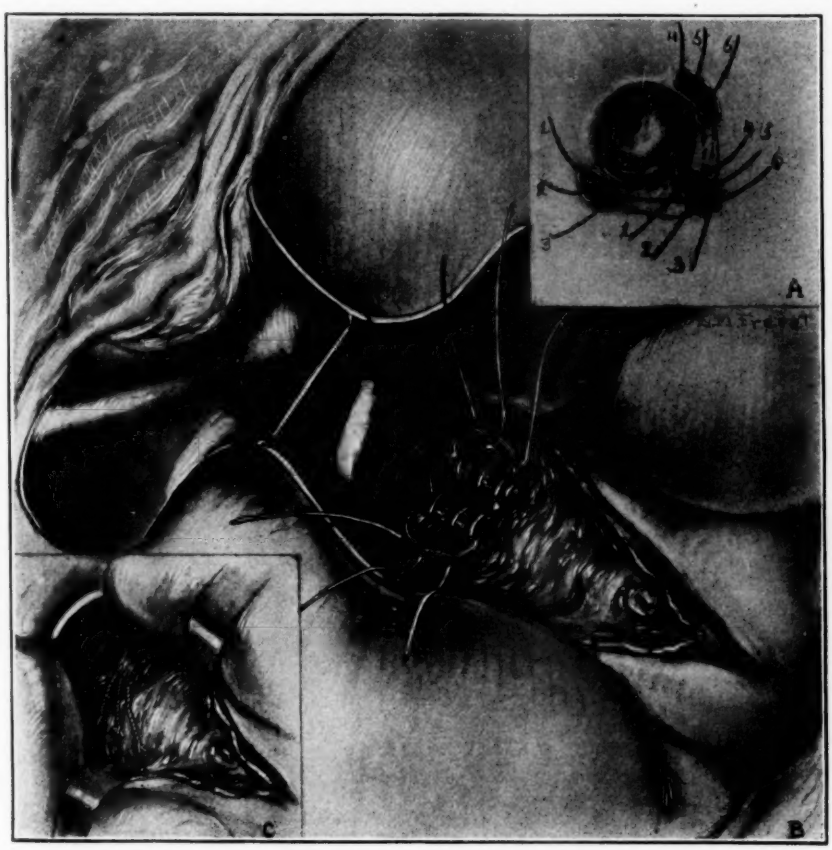

Fig. 3.

in the bottom of each sulcus a little posterior to the cervix, which when drawn down by tenacula, will meet in front of the cervix without undue tension. An area three-quarters by one-half inch is now denuded by one fairly deep bite of the scissors, exposing the edge of the pelvic fascia. A third area of the same size is denuded in front of the cervix (Fig. 2). The internal edges of the lateral denudations are now sutured to the opposing edges of the central area, leaving practically one broad denuded area just in front of the cervix (Fig. 3-*A*). The intervening areas which were not denuded fold over, forming two

little tunnels. The denuded area is then underlaid with two No. 26 silver wire sutures, taking three bites with each suture, first, under the right denuded area, catching the exposed edge of the pelvic fascia, second, a bite into the anterior surface of the cervix, and, third, under the left denuded area, again catching the exposed edge of the pelvic fascia (Fig. 3-*B*). These, when twisted, bring the edges of the pelvic fascia together and attach them to the anterior surface of the cervix. In other words, a bridge of fascia is built up in front of the cervix

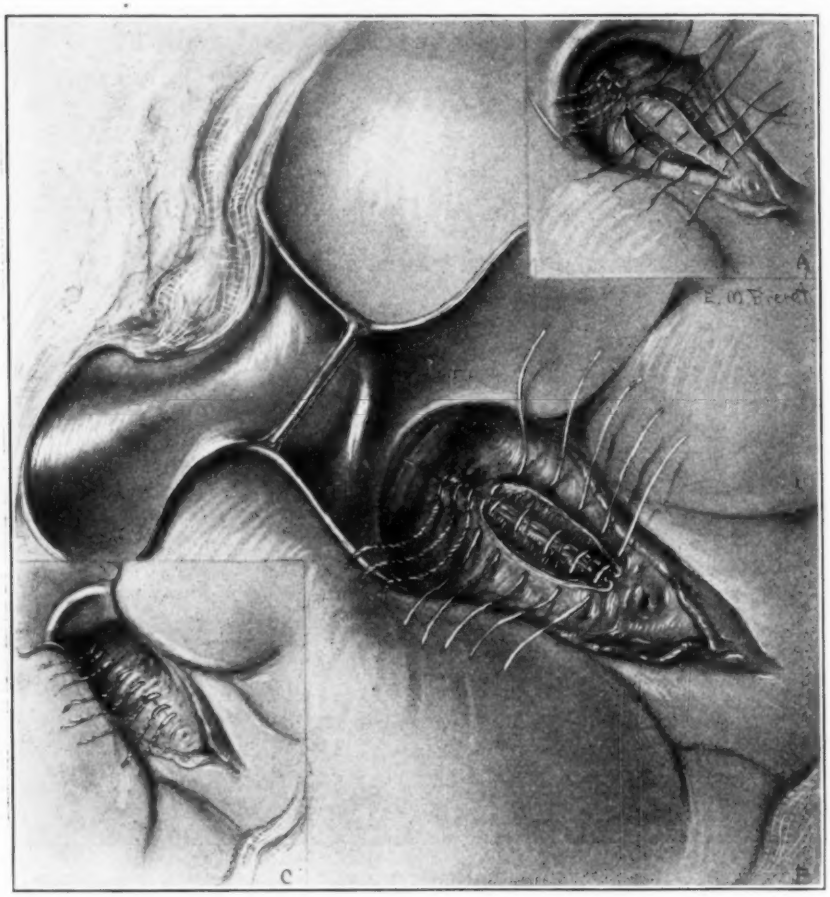

Fig. 4.

(Fig. 3-*C*). The success of the operation depends on the tension of this bridge. If there is too much tension, the sutures will cut out, and if too little, the uterus has too much play and will gradually force itself down again. It is only after repeated trials with the idea of tension in mind, that one is able to determine the proper places for the lateral denudations, and upon these areas the success of the operation depends.

The cystocèle is then treated by making two narrow denudations

from the bridge down almost to the meatus, suturing the internal edges, leaving a broad denuded area with an inturned tunnel of vaginal mucosa. The external edges are then brought together with three or four silver wire sutures (Fig. 4).

The stitch holding the cervix to the tip of the vaginal blade of the speculum is now cut and the speculum removed. The patient is placed in the lithotomy position and the rectocele dealt with in whatever manner the operator chooses. The method which has given us the best results is the high Hegar denudation with suture of the separated levators up to the level of the cervix and suture of the separated transversus perinei to form a new perineal body. The sutures are removed in from four to six weeks.

Since January, 1919, we have done this operation on 89 patients. One patient died a few days after operation from cerebral embolism. One developed a ureterovaginal fistula which, strange to say, was cured by passing a catheter into the ureter, using a Kelly cystoscope. There were two immediate failures which required secondary operation. Forty-five of these patients have been found by follow-up letters and 15 of these have been examined recently. Of these 45 patients, 43 are cured and two are not. One of these failures is only partial, there being a return of the cystocele.

The great advantage of this operation is that the anatomic relationship of the structures involved is not disturbed as in many of the other operations employed for the relief of this condition.

I wish to thank Dr. J. F. Todd for the privilege of operating on the cases of his service while I was associated with him at St. Peter's Hospital, Dr. John O. Polak for the privilege of doing this operation in his clinic, and Drs. W. F. Egan, of St. Peter's Hospital, and M. V. Armstrong, of the Long Island College Hospital, for the follow-up work.

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(*For discussion, see p.* 720.)

SUGGESTED BIOPHYSICAL INTERPRETATION OF CANCER*

By George W. Crile, M.D., Cleveland, Ohio

(From the Cleveland Clinic, Cleveland, Ohio.)

In recent papers[1] I have presented the conception that living processes, whether normal or pathologic, are primarily caused by alterations in the electric potential of (a) the unit cells of the organism and (b) the organism as a whole, and variations in electric potential are dependent upon points of highest and lowest potential—positive and negative poles. This conception of living processes has been called the "Bipolar Theory."

In accordance with this conception, one would suppose that if part of the cells of any tissue show an abnormal activity as compared with the other cells of the same tissue, one should make a comparative study of the normal and the abnormal cells to see if one could discover any differences in structure which would produce differences in the electric potential of the abnormal as compared with the normal cells.

Let us first examine the structure of the typical unit cell of the organism as a bipolar unit. It is composed of two major parts of different degrees of acidity, separated from each other by a semipermeable lipoid membrane. This membrane, as has been demonstrated by Dr. Hugo Fricke in the Biophysical Laboratory of the Cleveland Clinic, is $^4/_{10.000.000}$ cm. thick. A lipoid membrane of such exceeding thinness is a dielectric with electric capacity of a very high order. As estimated by Dr. Fricke, the electric capacity of the lipoid films of the blood corpuscles is 0.8 m.m.f. per sq. cm. In addition to these two major portions of the cell, both the cytoplasm and the nucleus contain multitudes of tiny spherules, each of which in turn is surrounded by a lipoid envelope of almost infinite fineness. We may suppose that the contents of these spherules in turn have a different reaction from that of the surrounding medium.

By virtue of these lipoid films, the greater the lipoid film surface, the greater the oxidative capacity of the cells; the greater the oxidative capacity, the greater the production of positive and negative ions; the greater the production of positive and negative ions, the greater the charges accumulated on the lipoid film which separates the nucleus from the cytoplasm. In a given cell, the greater the electric capacity the greater in turn will be the capacity to do work—the greater its capacity to grow. In the unit cell we assume that the ions accumulated upon the interior of the lipoid membrane of the

*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

nucleus from the more acid contents of the nucleus are positive, and attract to the opposite side of the film the negative ions from the less acid cytoplasm. It is this difference in reaction between the nucleus and the cytoplasm which makes the unit cell a bipolar unit.

It would follow that the greater the size of the nucleus in comparison to the size of the cell body, the greater would be the difference of potential between the positive charges within and the negative charges without. When this difference in potential has reached a certain point, one would suppose that the excess energy would be expressed in mitosis and division, first of the nucleus and then of the cell. This is what is known to happen in the process of fertilization. The head of the spermatozoon, which is principally composed of nuclear material, when added to the nucleus of the ovum, hugely increases the nucleus plasma ratio with increased accumulation of positive and negative charges on the lipoid film surrounding the nucleus, with in turn an increased potential of the cell which finally is transformed into an increased activity of the nucleus and later of the cell as a whole, as expressed in mitosis and cell division.

The high nucleus plasma ratio of the cancer cells as compared with normal cells has been recognized by many investigators although it is disputed by some. In many cases the potential of the cancer cells is enhanced still further by multiple nuclei which we may suppose would have the same or a similar effect upon the electric capacity of the cells with that produced by the addition of the spermatozoon to the nucleus. If this conception is correct, it would follow that the normal cells to their smaller nucleus plasma ratio, hence smaller lipoid film area, hence smaller capacity, hence lower potential, would not be able to compete with the cells with the increased nucleus plasma ratio and the latter cells would therefore encroach upon and crowd out the cells with smaller capacity.

If this conception is correct, then it should bear the test of biophysical measurements which should show that the capacity of cancer cells is higher than that of normal cells. To test this point, in the Biophysical Laboratory of the Cleveland Clinic, Dr. Hugo Fricke has devised an apparatus whereby the capacity of cells and animal tissues can be measured to a high degree of accuracy and by means of this apparatus, tissues from over 100 cases of cancer have been measured by Dr. Fricke and his collaborator, Dr. Sterne Morse. They have found that the capacity of malignant tumors has been uniformly far in excess of that of benign tumors or of normal tissue. They have found, moreover, and this finding appears most significant, that malignant tumors, after radiation, have a very low order of capacity.

Our first biophysical measurements, antedating those just described, were measurements of the electric conductivity of normal and of malignant tissues. In those studies the electric conductivity of 338 sections

of malignant tissues was measured and uniformly was found to be many times higher than that of the adjacent normal tissues. Moreover, the conductivity of the actively growing portions of a cancerous growth was found to be much higher than that of the degenerating portions. Both the electric conductivity measurements, therefore, and the capacity measurements are consistent with the bipolar theory.

Whether or not we are correct in our interpretation of these biophysical measurements, the uniformity of our findings to the present time would appear to indicate that capacity measurements of suspicious tissues may provide an additional and exceedingly accurate criterion for the pathologist. The histologic picture presents a static picture. The capacity measurement gives, in the exact figures of the physicist, the dynamic status of the cell and it is with the dynamic status of the cell that we are primarily concerned in the interpretation of the status of a suspected malignancy.

REFERENCES

[1]Crile, G. W.: Electro-Chemical Interpretation of Shock and Exhaustion. Surg., Gynec. and Obst., 1923, xxxvii, 342-352.

Crile, G. W.: A Biophysical Law Governing Surgical Mortality. Surg., Gynec. and Obst., 1924, xxxviii, 431-443.

Crile, G. W.: A Bipolar Theory of the Nature of Cancer. Ann. Surg., 1924, lxxx, 289-297.

(*For discussion, see p.* 711.)

THE TREATMENT OF INOPERABLE CERVICAL CARCINOMATA WITH MEASURED DOSES OF X-RAYS AND RADIUM BASED ON MICROSCOPIC EXAMINATIONS. THE FIVE YEAR END-RESULTS*

By Henry Schmitz, M.D., LL.D., F.A.C.S., Chicago, Illinois

THE treatment with radium and x-rays of borderline and inoperable carcinomata of the uterine cervix is a recognized procedure. The cancer becomes controllable and in many instances five year periods have been recorded free from all signs of the disease. The efficacy of radiation therapy in this disease depends on the radiation dose, the homogeneous distribution of the dose throughout the true pelvis, the cellular and structural type of the growth and the systemic reaction due to the activation of the defensive forces of the host. The curative value must be based on the five year end-results.

The radiation dose is the product of the qualty or intensity of the rays and the time of application. The standard or unit of the dose is determined by the reaction of the normal skin to a known quantity

*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

and quality of rays. A full skin dose has been applied if an intense reddening of the epidermis occurs within fourteen to twenty-one days after the radiation and a deep brown tanning after four to eight weeks. The skin erythema should be so intense that an increase of 10 per cent in the time duration will produce a second degree burn of the skin, evidenced by blistering and subsequent loss of the superficial layers of the epidermis. The full erythema skin dose has been designated a 100 per cent E. S. D., and is the standard of the radiation dose.

The output of an x-ray tube operated with known factors as kilovoltage, milliamperes, filters, focus skin distance, type of tube and size of field, can be measured with standardized instruments. The factors also determine the quality of the radiation. Therefore the same dose or a fraction thereof can always be applied if we observe the same factors of operation. The measuring instruments most frequently used are the Duane electrometer, the Fürstenau intensimeter, the Friedrich iontoquantimeter, and so forth.

The radiation intensity of a capsule of radium is practically constant. If the same factors in the application are observed, namely, the milligrams of radium element content, the geometrical size of the capsule, the time of application and the distance maintained between the capsule and the object to be rayed in air or water, the 100 per cent E.S.D. may be determined. This dose is constant and does not have to be remeasured if the same factors are maintained.

The homogeneous distribution of the rays within the true pelvis.—The true pelvic cavity represents the extent of a cervical carcinoma that may be successfully radiated. If the gowth has invaded the lumbar lymphnodes it is impossible to control its further progress with radiation treatment. The cavity is limited laterally by the bony pelvic girdle, superiorly by a plane drawn through the linea terminalis and inferiorly by the pelvic diaphragm. The bony girdle has a diameter of about 12 cm. and the height from the sacral promontory to the pelvic diaphragm is about 10 cm. The object of radiation therapy must be to distribute a measured dose of rays homogeneously through the true pelvic cavity, which is lethal for carcinoma cells.

The intensities of radium and x-rays decrease in an inverse ratio with distance and by absorption. However, the scattering of the primary rays causes an increase in the intensity. The latter is the greater, the deeper the rays advance in the body. It became imperative to investigate the actual distribution of the intensity of rays in a water phantom. It was made for two radium capsules of 25 mg. element each by Huth and the writer according to the method of Glasser in Friedrich's laboratory. From these measurements equal intensity

curves were constructed. (Fig. 1.*) These enabled us to determine the time duration of application of the radium capsules for the production of the 100 per cent E.S.D., for each one of the equal intensity curves. (Table I.)

TABLE I

EQUAL INTENSITY CURVE	MG. EL. HRS. FOR 100% E.S.D.	MEDIAN TRANSVERSE DIAMETER	MEDIAN LONGITUDINAL DIAMETER
60	1600	3.0 cm.	5.5 cm.
40	2400	4.5 "	6.3 "
30	3200	6.0 "	7.0 "
20	4800	7.0 "	8.0 "
10	9600	9.5 "	10.7 "
5	19200	13.8 "	13.9 "

The object of radiation therapy in cervical carcinomata must be to kill the malignant cells without causing irreparable injury to the normal tissues and organs within the radiation field. The posterior bladder wall is about 2.5 cm. distant from the cervical canal when the

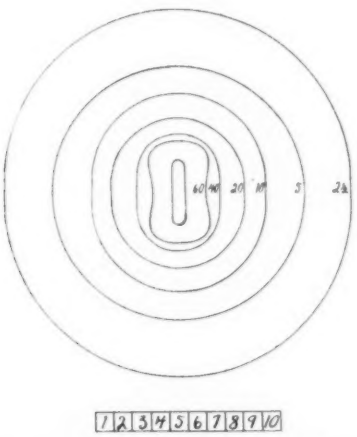

Fig. 1.—The equal intensity curves of 50 mg. radium element measured in water.

bladder is empty; and the anterior rectal wall is about 2.5 to 3 cm. distant from the cervical canal when the bowels are empty. If the organs are filled they are pressed closer to the cervix. This should be avoided. The radium capsules are always placed in the cervical canal. Hence the posterior bladder wall and the anterior rectal wall lie within the range of equal intensity curve 30 if the organs are kept empty. This can be achieved by placing a retention catheter in the bladder, using enemas and liquid diet and distending the vaginal canal with gauze. Normal tissue will bear without permanent injury a radiation dose of 150 to 175 per cent E.S.D. The 100 per cent E.S.D. is attained at equal intensity curve 30 with 3200 mg.el.hrs. of radium; the

*Figs. 1, 3, 4, 5, 6, 7, 8 and 9 are taken from the author's chapter in Gellhorn: *Medical Gynecology.*

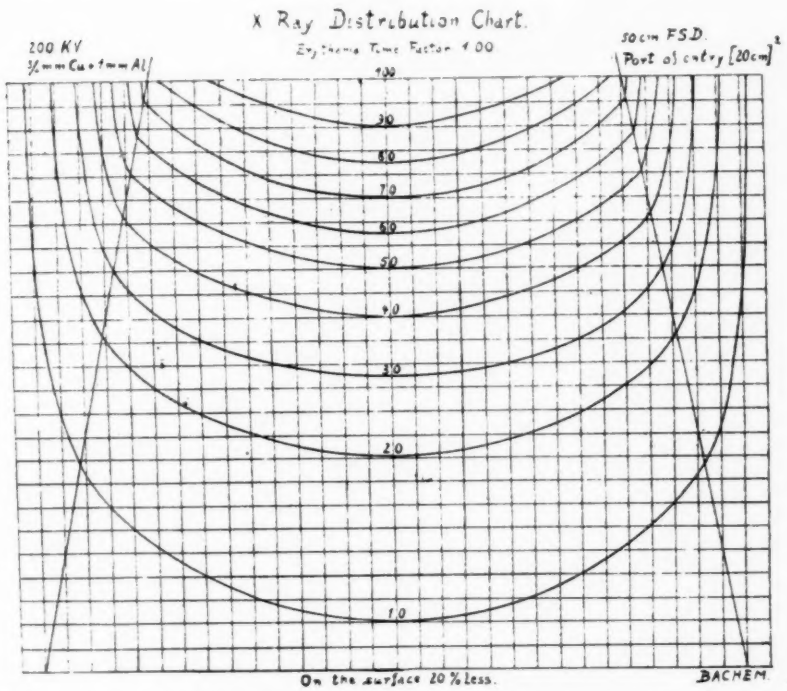

Fig. 2.—Equal intensity curves of x-rays measured in water. The factors are 200 KV., 0.75 mm. copper plus 1.0 mm. aluminum filter, 50 cm. focus skin distance and 20 x 20 cm. size of field. Time to produce a 100 per cent skin erythema is 100 minutes using 5 milliamperes.

150 per cent E.S.D. with 4800 mg.el.hrs., and the 175 per cent E.S.D. with 5600 mg.el.hrs. This dose represents the utmost limit of the radium dose if we wish to avoid necrosis of bladder and rectum. At the periphery of the pelvis the dose is then 30 per cent with 175 per

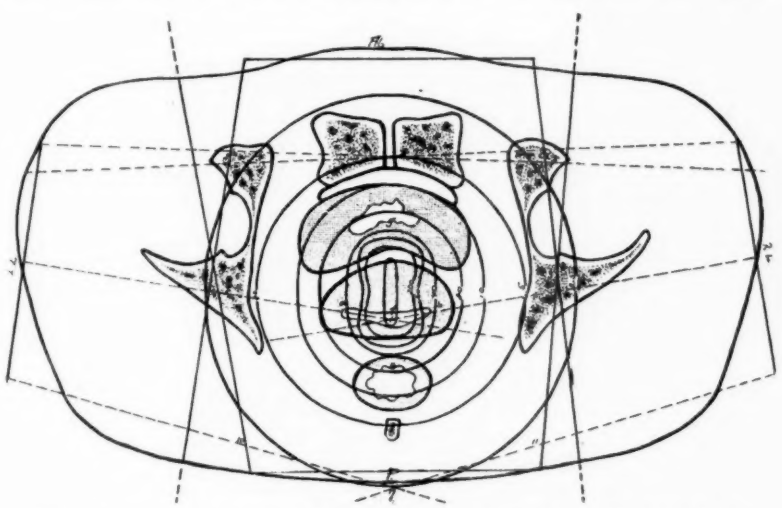

Fig. 3.—The calculation of the combined radium and x-ray intensities.

cent at equal intensity curve 30, and 25 per cent with 150 per cent at equal intensity curve 30. In other words up to isodose 30 the dose should arrest the growth, beyond 20 it will stimulate the growth of the cancer. We may conclude that radium therapy enables us to effectually destroy a cervical carcinoma that is confined within the region of equal intensity curve 20, which has a transverse diameter of 7 cm. and a longitudinal diameter of 8 cm. *if our 100 per cent E.S.D. is the lethal carcinoma dose.*

The distribution within the body of the intensities of x-rays produced with known factors has been studied by Dessauer, Glasser, Bachem, Erskine and others. Fig. 2 shows a chart constructed by Bachem most frequently used in short wave x-ray therapy. It gives the equal intensity curves in per cent of the 100 per cent skin dose.

If we assume that the average dimensions of a female body in the pelvic region are 22 cm. in the anteroposterior diameter through the cervix and 38 cm. in the transverse diameter and that the cervix usually lies at a depth of two-thirds of the anteroposterior diameter from the anterior abdominal wall, that is 14 cm., and use four x-ray beams, marked A., P., L.L. and R.L. in Fig. 3, then the distribution of the combined x-ray intensities at points 1 to 11 is as follows:

TABLE II

X-ray Beam	1	2	3	4	5	6	7	8	9	10	11
Anterior	31	31	31	26	50	100	15	59	59	12	12
Posterior	50	42	42	62	32	15	100	23	23	89	89
Left Lateral	19	36	11	17	19	0	14	39	10	30	10
Right Lateral	19	11	36	21	19	0	14	10	39	10	33
Sum	119	120	120	126	120	115	143	131	131	141	144

We may conclude that x-ray therapy permits a practically homogeneous distribution of the dose throughout the pelvis. X-rays alone would suffice to kill a cervical cancer *if the lethal carcinoma dose is our 100 per cent E.S.D.*

TABLE III

GROUPING OF 450 CASES OF CERVICAL CARCINOMATA ACCORDING TO YEARS AND PHYSICAL FINDINGS

Year	A. PRIMARY					B. RECURRENT					
	Group I	Group II	Group III	Group IV	Total	Group I	Group II	Group III	Group IV	Total	Summary
1914	1	1	14	3	19	1		3	4	8	27
1915		4	10	5	19		2	6	2	10	29
1916	1	2	8	5	16	2		6	3	11	27
1917		4	10	4	18	1	1	3	2	7	25
1918	1	4	17	9	31		1	6	5	12	43
1919	2	3	12	14	31			10	4	14	45
1920	2	3	19	18	42	5	2	3	3	13	55
1921	4	5	13	21	43		1	2	5	8	51
1922	1	5	38	20	64	2	2	2	6	12	76
1923	3	14	32	14	63	2	2	3	2	9	72
Total	15	45	173	113	346	13	11	44	36	104	450

TABLE IV

FIVE YEAR END-RESULTS IN CERVICAL CARCINOMATA

A. PRIMARY CARCINOMATA

	Group I			Group II			Group III			Group IV			Total		
Year	No.	Living	Per cent	No.	Living	Per cent	No.	Living	Per cent	No.	Living	Per cent	No.	Living	Per cent
1914	1	1		1	0		14	0		3	0		19	1	5.3
1915				4	3		10	0		5	0		19	3	15.7
1916	1	1		2	0		8	2		5	0		16	3	18.7
1917				4	2		10	2		4	0		18	4	22.1
1918	1	1		4	1		18	2		8	0		31	4	12.9
Total	3	3	100	15	6	40.0	60	6	10.0	25	0		103	15	14.5
B. RECURRENT CARCINOMATA															
1914	1	0					3	0		4	0		8	0	
1915				2	0		6	0		2	0		10	0	
1916	2	0					6	0		3	0		11	0	
1917	1	0		1	0		3	1		2	0		7	1	
1918				1	0		6	1		5	0		12	1	
Total	4	0		4	0		24	2		16	0		48	2	4.2

If we use radium without x-rays in cervical carcinomata, we are at a disadvantage due to the rapid decrease of the intensity and, therefore, inhomogeneous distribution of the rays. The regional lymph-nodes cannot be effectually destroyed. If we employ x-rays without radium then we are limited by the tolerance of the skin to a low dose though a homogeneous distribution of the rays throughout the pelvis is attained. However, if we use a combination of radium and x-rays then we can obtain a homogeneous distribution of a radiation intensity throughout the pelvis of 150 to 175 per cent E.S.D. beyond the equal intensity curve 20. The combined x-ray and radium dosage is determined by reducing or increasing the number of x-ray fields or by varying the time duration of the radium application. Within the

TABLE V

PERCENTAGES OF OPERABILITY, AND RELATIVE AND ABSOLUTE CURABILITY OF CERVICAL CARCINOMATA FOR DIFFERENT METHODS OF TREATMENT

Clinic	Operability Per Cent	Total Number	Total Number	Relative Cures	Absolute Cures	Method of Treatment
Clark, T. G.	17	140	12	27.2	8.6	Radium
Bailey & Healy	22	155	17	26.4	9.2	Radium
Kehrer	45.7	129	36	40.7	27.8	Radium
Doederlein	32.6	755	103	30.3	13.2	Radium and X-rays
Baisch	51.0	198	28	23.8	14.1	Radium and X-rays
Schmitz	17.5	103	15	50.0	14.6	Radium and X-rays
Johns Hopkins	52.1	387	102	46.5	26.6	Surgery
Stoeckel	70.6	350	98	35.4	26.6	Surgery
Graves	64.0	181	34	34.2	18.5	Surgery

equal intensity curve 30 the dose is destructive. However a destruction of the uterus is not objectionable. I must refrain from a more detailed description of the technic. Those interested may find it in Gellhorn's "Non-Operative Treatment in Gynecology," page 370.

The radiation sensitiveness of cervical carcinomata depends on the cellular structure and not the type of growth. The nomenclature applied to cervical cancers differs greatly in the literature. A uniformity would be very desirable. We have adopted the classification of Schottlaender and Kermauner,—so have Alter, Martzloff and others.

The cervical carcinomata are composed of either basal cells, squamous epithelial cells or cylindrical epithelial cells. The basal cells are embryonal, unripe spindle-shaped cells arranged in alveoli. They have not as yet acquired the riper and maturer forms of the squamous and cylindrical epithelial cells. The latter have usually an adenomatous arrangement. We found in our series 60 per cent squamous, 15 per cent basal celled, and 25 per cent adenomatous. Transitional and mixed forms composed of basal and squamous or cylindrical cells

are also found. They are included in the squamous cell growths and amounted to 12 per cent.

Carcinomata may be of soft consistence when they are of a medullary type. Such a cellular growth is a very acute lesion. The new growth may be of a medium consistence when cells and stroma are present in an even amount. This type has been termed carcinoma simplex. The cancer may be of hard consistence, when the connective tissue frame-work predominates. It is termed a scirrhus cancer. A tumor which shows fibrous reaction is more chronic in its course. Schottlaender and Kermauner found in 140 cervical carcinomata 115 primary solid cancers, and 73 were medullary, 12 simplex, and 30 scirrhus type. The adenomatous cancers numbered 25.

The manner of growth may be either proliferative, everting, exophytic or infiltrative, inverting, endophytic. Exo-endophytic growths, also, occur. The same authors found in the solid carcinomata 5 per cent exophytic, 24 per cent exo-endophytic and 71 per cent endophytic, and in the adenomatous carcinomata 17 per cent exophytic, 46 per cent exo-endophytic and 37 per cent endophytic. There is no connection between the type of cell and the manner of growth.

Clinically, the basal-celled, medullary and infiltrating tumor is the most malignant.

The law of the radiation sensitiveness of tissues of Bergonié and Tribondeau reads: "Immature cells and cells in an active state of division are more sensitive to rays than are cells which have already acquired their fixed adult morphologic and physiologic characters." Ewing states: "It thus appears that the pathological processes in the two classes of tumors—embryonal and adult—are essentially different. This fact was hardly appreciated until it was revealed as a formidable obstacle to radiation therapy. A tissue invaded by an embryonal or lymphoid tumor may be restored to a normal state without appreciable scarring, but when the tissue is invaded by a squamous or alveolar carcinoma that tissue is condemned to extensive scarring or complete destruction." Lahm, Alter and the writer have expressed similar views. The type of growth whether medullary, simplex or scirrhus does not seem to influence the radiation sensitiveness of the cancer cells.

Can the difference in radiation sensitiveness between the unripe and riper epithelial cell cancers be stated in per cent of the E.S.D.? If so, would it be practical to calculate the dose from the microscopic findings?

The application of a lethal carcinoma dose should be followed by negative palpatory and microscopic findings. The cervix should be healed, the parametria be free of indurations, the pelvic organs become movable and of normal consistency, though scar formation may leave cicatricial bands in the parametria. The microscopic examina-

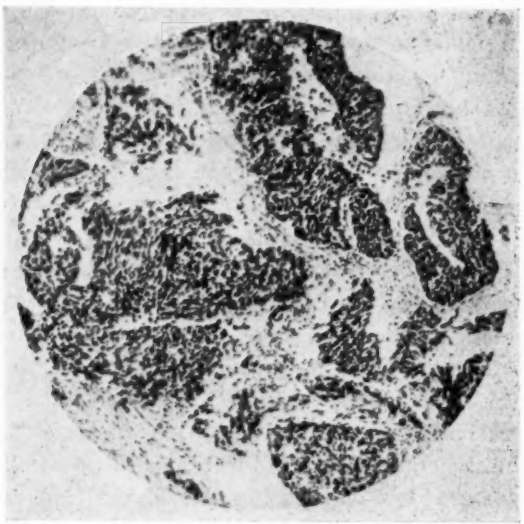

Fig. 4.—Unripe basal-celled carcinoma of the uterine cervix before radiation treatment.

tion of excised tissue from the healed cervix must reveal a complete absence of epithelial cancer cells. The normal palpatory findings and the absence of malignant cells in the tissues, therefore, are the criteria upon which we must base the therapeutic efficacy of radiations in malignant disease. Should local healing continue for five years free of any recurrence, then the cure is an anatomic one and should be designated complete.

We have kept exact records of all the cases of cervical carcinomata

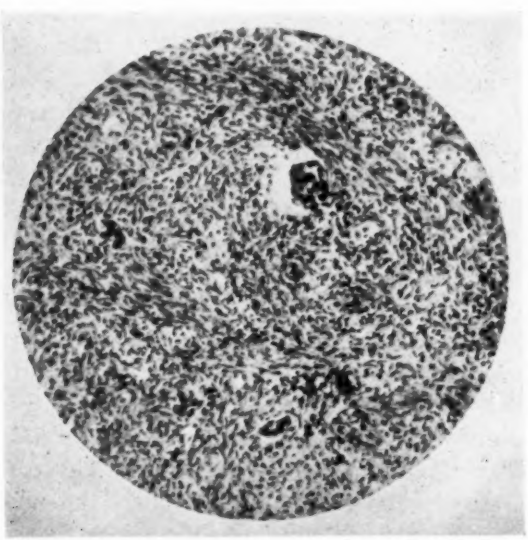

Fig. 5.—The histologic changes caused within three weeks in the basal-celled cancer seen in Fig. 4, with a combined 100 per cent E.S.D. of radium and x-rays.

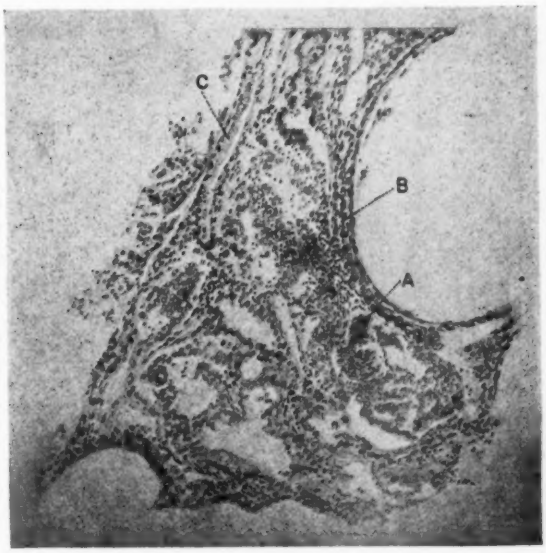

Fig. 6.—Adenocarcinoma of the uterine cervix before radiation treatment.

entering our clinic. We made microscopic sections of the cervical tissues before the application of the rays and weekly after the treatment; we recorded the physical bimanual findings and the cystoscopic and proctoscopic examinations at every re-examination and maintained a follow-up system. The microscopic re-examinations were carried out in more than one hundred cases. It would require too much space

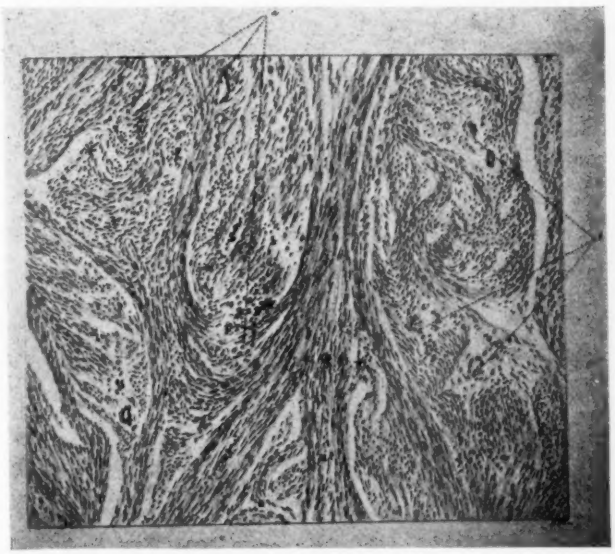

Fig. 7.—Microscopic section from the same cervix after radiation treatment. The uterus was removed ten days after a combined radium and x-ray treatment of about 150 per cent E.S.D. Note the marked fibroblastic and leucocytic infiltration and almost complete disappearance of the carcinoma cells.

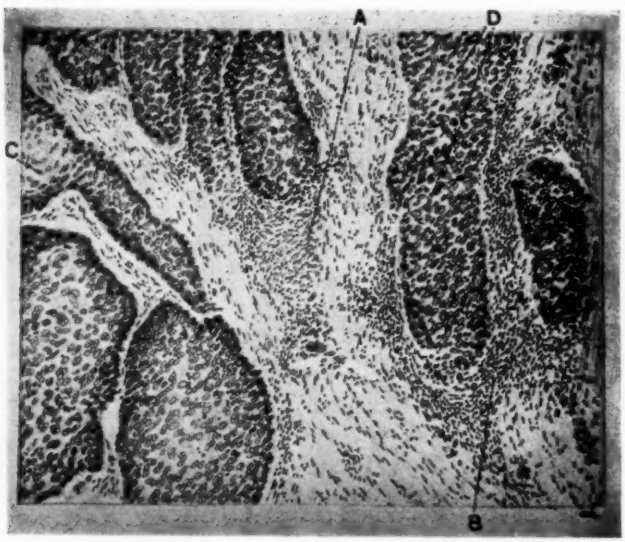

Fig. 8.—Squamous epithelial cell cancer of an endophytic growth of the uterine cervix before radiation treatment.

to recite the details of dosage and comparisons with the microscopic and physical findings.

The basal cell carcinomata of the cervix responded rapidly to a 100 per cent E.S.D. with local healing and negative microscopic findings. (Figs. 4 and 5.) The adenocarcinomata and squamous epithelial cell cancers required a 150 to 175 per cent E.S.D. to assure local healing and negative microscopic findings. (Figs. 6, 7, 8 and 9.) The 175 per cent E.S.D. causes scarring of the uterus and second degree

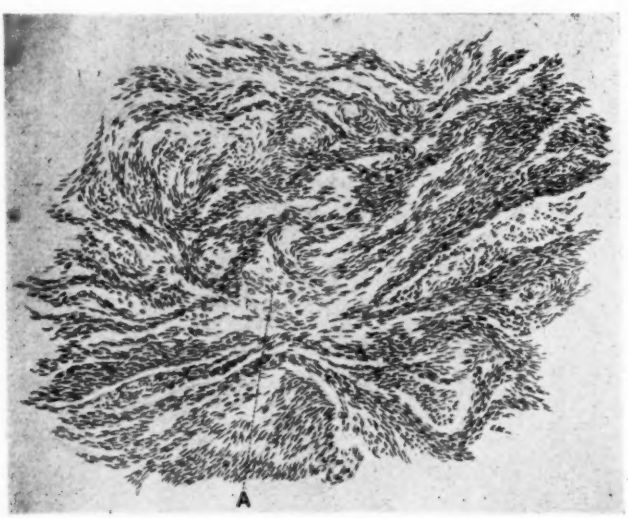

Fig. 9.—The same uterus was removed three months after the application of about 175 per cent E.S.D. of radium and x-rays. Note the connective tissue formation and the absence of malignant cells.

burns of the normal epithelium. The normal tissues within the radiation area invariably recover from the damage. This may be best studied by repeated endoscopic examinations of rectum and bladder. Superficial ulcerations caused in these organs by the course of massive rays heal gradually, and disappear within six to eight weeks subsequent to the treatment. Should healing of the cancer not ensue it is not advisable to re-treat the patient. We have never seen any benefit from such re-treatment. Contrary the tissues will not recover from the added damage. They become indurated and break down. Such radiation induration and ulcers form very slowly and rarely appear and cause symptoms before the expiration of a year or more. Contractions of the bladder and strictures of the rectum and bowels, ureteral stenoses with hydronephroses are some of the end-results. Therefore, if our measured massive dose of rays does not result in a control of the cancer, we advise against a repetition of the treatment.

Is the calculation of the combined radium and x-ray dose based on the microscopic findings practicable? Fifteen per cent of microscopic examinations have shown an unripe basal cell cancer. In view of the fact that a 175 per cent E.S.D. distributed homogeneously throughout the pelvis is almost always followed by severe local reactions, we deem it necessary to administer the dosage which will ensure control of the cancer. Therefore we apply a measured 100 per cent E.S.D. in basal-celled cancers and 150 to 175 per cent in the riper-celled carcinomata.

The Systemic Reaction.—The statement has been made in the preceding paragraph that control or healing of the cancer does not always follow the application of a measured combined radium and x-ray dose. In the literature the same observation is frequently quoted. How may we explain such a refractory behavior?

Cellular destruction follows exposure to x-rays and radium. The split proteins give rise to an acute intoxication. Numerous observations point to the increased protein metabolism as shown by the increased amount of protein derivatives in the urine. Hall and Whipple observed in dogs, after massive doses of roentgen rays, that the nonprotein nitrogen of the blood was markedly increased a short time before death. The urinary nitrogen also increased and remained high until the death of the animals. These authors conclude that the roentgen ray intoxication or general constitutional reaction is a good example of a "nonspecific" intoxication. Hirsch and Peterson could not demonstrate a striking or consistent alteration in the urea nitrogen, total nonprotein nitrogen, uric acid and creatinin in blood of carcinoma patients treated with roentgen rays. Cori and Pucher found an increase in the total nitrogen in all cases in the postradiation periods. It is very probable that a great part of this increase of total nitrogen was due to elimination of destroyed cells. They state that roentgen sickness is not due to excessive cell catabolism.

At the 1923 meeting of this Association I reported the chemical blood analyses of thirty-five cases of carcinomata subjected to chemical blood analysis. The cases which were successfully radiated all showed an increase in the nonprotein nitrogen constituents.

It seems probable that the systemic reaction or the radiation sickness is due to an absorption into the circulation of protein liberated by the destruction of cells. It is more marked in persons in a toxic condition from autolytic processes taking place in the cancer. Such patients are already embarrassed in dealing with an intoxication and, if to this strain is added the metabolic labor of dealing with the complete decomposition of a large amount of broken-down tissue products, the metabolism may collapse, and in consequence signs of severe intoxication appear.

The intoxication is characterized by the symptom complex seen during the negative phase of any nonspecific protein toxicosis. It causes an activation of the defensive forces of the host and thereby aids in the arrest or complete reabsorption of the growth. Should the negative phase, however, persist, because the host cannot any more activate the defensive forces, then the growth will not heal and the patient, also, will show a continued progress in the constitutional manifestation of the disease.

The intoxication should be treated symptomatically. Elimination of the toxic proteins may be stimulated by diuresis and catharsis. Plenty of fluids should be given. Castor oil is the preferred cathartic. Rest in bed, hydrotherapy for hyperpyrexia, nourishing liquid food by mouth or rectum are necessary. Acidosis requires alkalinization with solutions of sodium bicarbonate or hypodermoclysis with normal saline and glucose solutions. Alkalinosis may be treated with mild acids, as orange and lemon juices. The nausea and vomiting may be controlled with hypodermic injections of atropine or large doses of bismuth subnitrate. The latter also counteracts the profuse diarrhea.

Should the symptoms become alarming then hypodermoclysis of normal saline solutions is indicated. Extreme cases require transfusions of whole blood.

A persistence of the toxemia and a concomitant rapid loss of weight and strength also demand transfusions of whole blood. The intravenous injections of colloidal metals and foreign proteins are beneficial. They are followed by rigor, pyrexia and leucocytosis, that is, a nonspecific reaction. We observed that patients with a persistent toxicosis and lack of evidence of local healing improved after repeated injections of colloidal metals or proteins. The blood count returned to normal, local healing ensued, and weight and strength returned. "Radiation cachexia" is probably a radiation intoxication with a persistent and chronic course.

THE END-RESULTS

From January 1, 1914, to December 31, 1923, four hundred and fifty cases entered our clinic: 345 of the patients had primary carcinomata and 105 had a recurrence following surgical procedures. The cases were grouped according to the bimanual findings as follows: Group 1 contains the cases in which the cancer is clearly localized in the cervix. In Group 2 are placed the cases which show a doughy or edematous consistency of the paracervical tissues. Group 3 includes the cases in which the parametria, the contiguous organs or regional lymphnodes are found invaded; and Group 4 comprises the cases with a frozen pelvis, distant metastases and advanced cachexia from autointoxication of broken-down and infected tumors. Group 1 cases complicated with grave constitutional diseases are not subjected to surgery but to radiation therapy. See Table III.

From January, 1914, to December, 1918, we treated 103 primary and 48 recurrent cervical carcinomata with the combined method of x-rays and radium. Of the 103 primary carcinomata 16 passed the five-year limit well and free of recurrence, that is an absolute cure of 14.2 per cent. Of 42 recurrent carcinomata only 2 passed the five-year period, an absolute cure of 4.5 per cent. See Table IV.

The comparison of results obtained in other clinics is of interest. We tabulated in Table V three clinics in which radium alone was used, the total number is 424 with 65 five-year cures or 13.0 per cent; three clinics in which radium and x-rays were used in combination, the total number is 1056 with 146 five-year cures, or 13.8 per cent; and three clinics in which surgery was used, the total number is 918 with 234 five-year cures, or 25.5 per cent.

If we refer to the operability percentage of the various clinics we observe that it is very high in the surgical statistics and very low in the radiologic statistics. We may explain this in two ways: The surgical clinics retained the operable and early cancer cases, and the advanced cases drifted to the radiologic clinics. Low operability percentage means unfavorable material from the standpoints of treatment and prognosis, and therefore low curability. If we consider the absolute curability percentage from this viewpoint we feel that the results obtained with radiation therapy are encouraging.

CONCLUSIONS

1. The definitions of the radiation dose and the standard unit of dose have been given.

2. The principle of the homogeneous distribution of the rays has been discussed and the measured radiation dose has been described.

3. The difference of radiosensitiveness of unripe- and riper-celled carcinomata has been expressed in per cent of the unit erythema skin

dose. It is deemed essential to determine the measured radiation dose from the microscopic examination of the cervical tissues.

4. The systemic reaction is a nonspecific protein toxicosis caused by the absorption of proteins liberated by the action of the rays. The toxicosis causes an activation of the defensive forces of the host and thereby aids in the reabsorption of the broken-down tissue masses. A persistence of the toxicosis means negative results from the radiation treatment. However the defensive forces may be activated by the use of colloidal metals and foreign proteins.

5. The five-year end-results have been given and compared with those of the surgical treatment. If we consider the operability percentages then the results obtained with radiation therapy are very good.

25 EAST WASHINGTON STREET. (*For discussion, see p.* 711.)

RADIATION THERAPY OF CARCINOMA OF THE UTERUS*

BY U. V. PORTMANN, M.D., CLEVELAND, OHIO

(From the Cleveland Clinic.)

THE principal advances in roentgen ray therapy within the last year have been technical improvements in apparatus based upon an extending knowledge of the physics of radiation. We now have a more accurate apparatus for the measurement of dosage, and a water cooled Coolidge tube capable of carrying large currents has been developed, by the use of which the time required for treatment has been considerably decreased. Investigations of the biologic effects of radiation have included extensive studies of the effects of radiation on different types of tissues, on glands and malignant growths in particular; but little of actual value except the histopathology has been established, and no explanation of the effects of radiation on the cells has thus far been offered. In this country, roentgen ray therapists have for the most part followed the early example of certain European clinics, administering massive doses of radiation to all types of malignant growths. Within the last year a tendency to moderate this technic has developed. The massive dose method consists in administering as much radiation as possible within a short period of time, this procedure being based upon the theory that radiation produces a specific destructive effect upon neoplastic cells and that, therefore, the maximum number of cells will be destroyed by an overwhelming dose. It has now been established, however, that it is impossible to deliver by roentgen rays much more than

*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

one erythema dose, or 100 per cent E. S. D., to such a deeply situated organ as the uterus or to any other equally limited field, and it is well known that this dosage will not destroy most types of malignant growths. Although most normal tissues, with the exception of certain glands, can withstand an erythema dose without being permanently damaged, a very definite and sometimes severe systemic reaction follows such a dose of roentgen rays delivered over large areas, and consequent nausea, diarrhea, fibrosis and blood changes may lower the vitality and resistance of the patient very considerably.

To avoid these deleterious reactions the present tendency is to moderate the treatment in such a manner as to preserve and build up rather than to diminish the resistance of the patient. It is conceded that there exists an organic resistance to malignancy and that our end will be defeated if this resistance is destroyed by overradiation. Before the advent of deep or short wave therapy, some cases were benefited or even cured by dosage that would not now be considered as therapeutic. It is probable, therefore, that radiation produces some beneficial effect upon the patient in addition to the actual destruction of the malignant cells and that we should endeavor to build up resistance to the disease as well as to destroy neoplastic processes. In any event, we should at least endeavor to do the patient no harm in our zeal to cure.

Several methods for dividing the dose are being used. Some roentgenotherapists apply the radiation for only a few minutes each day over a long period of time. We prefer to administer as large a dose as would be given by the massive dose method, but divided into shorter periods of perhaps one-half hour each, daily or on alternate days, according to the condition of the patient, until the total amount has been administered. We have found that by this method nausea and diarrhea rarely occur and apparently the changes in the blood cells, which probably play an important part in the resistance of the patient, are not so marked. It is our practice to administer a full roentgen ray treatment either before or after a full dose of radium while the patient is under observation in our radiation hospital.

In reviewing the most recently published statistics, it is impossible to reach any definite conclusion as to the value of roentgen ray therapy in the treatment of carcinoma of the uterus. Many reports include the results of combinations of roentgen ray therapy with radium or surgery and many statistics of the results of radium therapy probably include roentgen ray treatment, although it is not always so stated. Roentgenologists have been reluctant to quote results during this transitional period. The results of surgical treatment are well known. The results of radium therapy in the United States vary considerably, probably because of variation in technic and in the amounts of radium used.

In the following summary, however, I shall quote certain statistics of

the results of roentgen ray therapy of cancer of the uterus, published during 1922 and 1923.

Dr. Greenough's[1] recently published report for the *American College of Surgeons* indicates that some benefit apparently results from roentgen ray therapy, though no statement is made regarding the results of x-ray treatment alone. Among the cases in Group I *A*, hysterectomy alone cured 34 per cent; radium alone 16 per cent; radium with palliative operation and x-ray 42 per cent; radium with or without palliative operation and x-ray 25 per cent. Among the cases in Group I *A* and I *B* combined, we find that hysterectomy alone cured 31 per cent; hysterectomy with or without radium 32 per cent; radium alone 12 per cent; radium with palliative operation, or x-ray 37 per cent.

Henry Schmitz[2] reports 11.1 per cent cures among his cases of inoperable cervical cancer and 42.8 per cent cures among the localized and borderline cases. I believe that his method of treatment has been a combination of radium and x-ray with or without a palliative operation.

Douglas Webster[3] quotes Heyman's statistics in 66 cases, of which 94 per cent were inoperable; among these, five year cures were obtained by combined radium and roentgen ray therapy in 28.8 per cent. Dr. Heyman has recently informed me that he has abandoned roentgen ray therapy except in advanced cases, because of the deleterious effects which he has observed.

In 1922, Prof. L. Seitz[4] gave the following two year results: among cases treated by deep roentgen ray therapy combined with radium, apparent cures in 56 per cent; among cases treated with x-ray alone, apparent cures in 53 per cent. Among cases treated during a previous five year period, during which very small doses of radium were used and in which the main effect must have been due to the roentgen rays, he cured 20.7 per cent of the inoperable and apparently hopeless cases.

Van Raamsdonk[5] reports that between 1915 and 1920, he had treated 158 cases, most of them by roentgen ray therapy alone, though in some cases radium was used to check hemorrhage. The Group I cases were operable but total ablation was not performed. These included 3 cases of which 1, or 33.3 per cent, has lived for five years, and 2, or 66.6 per cent have lived without recurrence for three and a half years. The Group II cases were inoperable and of the 106 cases in this group, 13, or 12.3 per cent, were living without recurrence. Group III included cases in which recurrence had occurred after total ablation; among these, 6, or 20.3 per cent, were surviving without recurrence. The cases in Group IV had received prophylactic treatment after total ablation and among 14 cases, 10, or 71.5 per cent, were in perfect health, one and a half to five years after treatment.

E. Muhlmann[6] reports two series of cases of cancer of the uterus treated by combined radium and roentgen ray therapy. In the first series he includes cases treated between 1915 and 1918. In this group there were 30 inoperable or hopeless cases, among which 16 per cent had been free from recurrence for five years. In the second series, comprising cases treated between 1918 and 1920, there were 22 inoperable cases which had been followed for from three and a half to five years; of these 2, or 13.6 per cent, were living and free from recurrence. Among 16 operable and inoperable cases treated during 1920-1921, 6 or 37.5 per cent were still living at the time of this report.

A. Giesecke[7] reports 371 cases of cancer of the uterus. Of the cases of carcinoma of the cervix, among which 70.6 per cent were considered as operable, 26.6 per cent were cured; and 47.62 per cent of the cases of carcinoma of the fundus had been cured by operation followed by roentgen ray therapy. Among

the inoperable cases, 8.33 per cent had been cured by combined radium and roentgen ray therapy.

Opitz[8] reports 21 cases living four and a half years. Six of these cases were in Group I. Of his Group II cases, he reports cures in 33.3 per cent.

Winter[9] reports that 55.6 per cent of his cases in Groups I and II were cured by surgery followed by x-ray therapy, as compared with only 39 per cent cured by surgery without postoperative radiation.

Zacherl and Lundwall[10] report cures in 49.3 per cent of their cases which received postoperative radiation.

Our own experience is too brief to be of value. Since 1920, we have seen 138 cases of carcinoma of the cervix, 87 of which were primary and were treated by radium alone. Of these 138 cases, 48, including 7 operable and 41 inoperable cases, have been observed since we began the use of the present method of combined radium and deep x-ray therapy; 21.9 per cent of these died within two years or less; 40.7 per cent are living six months or less since treatment; 25 per cent have survived for one year or more and 12.5 per cent are still living two years or more since treatment. There were 7 operable cases all of whom are living. From these statistical studies we may conclude that the average curability of *inoperable* carcinoma of the cervix by combined radium and x-ray therapy should be at least 12 per cent. The curability of operable cases, or Group I, is problematic although Schmitz states that he cures 75 per cent and Opitz claims 100 per cent cures in a small group of cases; final conclusions, however, cannot yet be drawn. Hysterectomy followed by radiation shows an average of 40.3 per cent cures, a slightly higher figure than that obtained from hysterectomy alone.

REFERENCES

[1]Greenough, R.: Surg., Gynec. and Obst., 1924, xxxix, 18-26.
[2]Schmitz, H.: Am. Jour. Roentgenol., 1922, ix, 662-670.
[3]Webster, J. H. D.: Lancet, 1923, i, 373-378.
[4]Seitz, L.: Klin. Wchnschr., 1922, 1, 741-742.
[5]Van Raamsdonk, C. P.: Nederl. Maandschr. v. Geneesk., 1923, xii, 45-60.
[6]Muhlmann, E.: Strahlentherapie, 1923, xvi, 137.
[7]Giesecke, A.: Arch. f. Gynäk., 1922, cxv, 435-460.
[8]Opitz, E.: München. med. Wchnschr., 1923, lxx, 1299-1300.
[9]Winter, F.: München. med. Wchnschr., 1923, lxx, 7-9.
[10]Zacherl, H., and Lundwall, K.: Zentralbl. f. Gynäk., 1923, xlvii, 623-636.

(*For discussion, see p.* 711.)

THE RÔLE OF RADIUM IN THE TREATMENT OF CANCER OF THE CERVIX*

By Thomas E. Jones, M.D., Cleveland, Ohio

(From the Cleveland Clinic.)

INASMUCH as the choice of treatment in any disease should be guided by a comparison of the accumulated end-results secured by different observers, I am offering the following report based upon a comparative study of the results secured in 166 cases of cancer of the uterus which have been under treatment in the Cleveland Clinic during the past four and one-half years. Of these, twenty-nine were treated by surgery alone, seventeen by surgery and radiation, and one hundred and twenty by radiation. This report is confined to a study of the results obtained in the cases of cancer of the cervix included in the last two groups.

Table I shows nine cases that were treated four or more years ago. The average age was forty-five years; the average duration of symptoms, seven and one-half months; four cases were in Group III, that is, *both* the parametrium and the vagina were involved; and five cases were in Group II in which *either* the parametrium or vagina was involved. The type of malignancy in each of the cases in these two groups was squamous-celled carcinoma. Among these nine patients, *three or 33 per cent are known to be living and free from all symptoms. One lived for forty-six months. One case has not been traced.* The average duration of life in those patients who died was seventeen months.

Table I

Results of Radium Therapy in Cases of Carcinoma of the Cervix Treated During 1920.

No.	Age	Duration Symptoms	Type	Diagnosis	Duration of Life Since Radiation	
					Still Living	Dead
1	35	6 mos.	II	Sq. ca.	52 mos.	
2	45	12 mos.	III	Sq. ca.		16 mos.
3	63	6 mos.	II	Sq. ca.		46 mos.
4	38		III	Sq. ca.		Not heard from
5	42	12 mos.	II	Sq. ca.	48 mos.	
6	45	4 mos.	III	Sq. ca.		8 mos.
7	50	12 mos.	II	Sq. ca.	48 mos.	
8	42	2 mos.	II	Sq. ca.		7 mos.
9	45	6 mos.	III	Sq. ca.		8 mos.
9	Av. 45	Av. 7½ mos.	5-II 4-III	Sq. ca.	3 or 33%	Av. 17 mos.

*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

Table II shows a series of eighteen cases treated three or more years ago. The average age of the patients in this group was fifty-one years; the average duration of symptoms, twelve months. The three cases diagnosed as belonging to Group IV, showed an extensive involvement in the pelvis and were, therefore, looked upon as hopeless. Nine were in Group III, four in Group II and two in Group I. In three cases the pathologic diagnosis was adenocarcinoma; in fifteen, squamous-celled carcinoma. Of these eighteen patients, *four or 22 per cent were known to be living and free from symptoms at the end of three years.* The fact that this percentage is not as high as the percentage of four year survivals may be explained by the following facts: (1) The average duration of symptoms in the series treated four years or more ago was seven months, whereas in this second series the average duration of symptoms was twelve months. (2) Three of the second series were hopeless cases of which there were none in the first series. (3) One patient who had lived for thirteen months and was clinically cured, died of heart disease and *one has not been traced.*

Table II shows a series of twenty cases treated in 1922. The average age was forty-seven years, the average duration of symptoms, nine months. Three of these twenty cases were in Group I, three in Group II, nine in Group III and five in Group IV. The pathologic diagnosis was squamous-celled carcinoma in seventeen cases and adenocarcinoma in three. *Eight patients or 40 per cent are known to be living,* an average of twenty-six months after treatment. Six are known to be dead *and six have not been traced.*

Table IV gives the average results in a series of forty-two cases treated less than two years ago. The average age was fifty-two, the average duration of symptoms, eleven months. Eleven of these cases were in Group IV, thirteen in Group III, twelve in Group II, six in Group I. Of these, *twenty-six or 60 per cent are known to be living;* two-year figures are not conclusive however. Practically all of these cases have been treated with deep x-ray therapy and it remains to be seen whether the four and five year results will be better in this group than in the previous series in which radium alone was used in nearly all cases.

In Table V which gives statistics published by Heyman of Stockholm it will be noted that an average of from 26 to 32 per cent of the cases treated in 1914, 1915 and 1918 remained symptom-free for five years or more. During a recent conversation with Professor Heyman he said that he thought the very low survival percentages for the cases treated in 1916 and 1917 were due to two facts: (1) The results of previous years were so good that a number of the leading surgeons and gynecologists in Sweden stopped operating on cancer of the cervix and Professor Heyman's Institute became overcrowded. He had only

TABLE II

RESULTS OF RADIUM THERAPY IN CASES OF CARCINOMA OF THE CERVIX TREATED DURING 1921

No.	Age	Duration Symptoms	Type	Diagnosis	Duration of Life Since Radiation	
					Still Living	Dead
1	35		III	Sq. ca.		4 mos.
2	34		III	Sq. ca.		5 mos.
3	50		II	Sq. ca.		20 mos.
4	53	24 mos.	III	Sq. ca.		23 mos.
5	41	2 mos.	II	Ad. ca.		11 mos.
6	48		III	Sq. ca.		9 mos.
7	57	12 mos.	I	Ad. ca.	40 mos.	
8	56	12 mos.	II	Sq. ca.		11 mos.
9	57	9 mos.	IV	Sq. ca.		Date not known
10	56	9 mos.	IV	Sq. ca.		Date not known
11	46	8 mos.	III	Sq. ca.	36 mos.	
12	33	24 mos.	II	Sq. ca.	36 mos.	
13	67	12 mos.	III	Sq. ca.		13 mo.—heart
14			I	Sq. ca.		Not heard from
15	55	4 mos.	III	Sq. ca.		Date not known
16	73		IV	Sq. ca.		8 mos.
17	70		III	Ad. ca.		19 mos.
18	33	12 mos.	III	Sq. ca.	32 mos.	
18	51 Av.	Av. 12 mos.	3-IV 9-III 4-II 2-I	3 Ad. ca. 15 Sq. ca.	4 or 22%	13 Dead 1 Not heard from 1 Dead heart disease

TABLE III

RESULTS OF RADIUM THERAPY IN CASES OF CARCINOMA OF THE CERVIX TREATED DURING 1922

No.	Age	Duration Symptoms	Type	Diagnosis	Duration of Life Since Radiation	
					Still Living	Dead
1	52		III	Sq. ca.		12 mos.
2	58	9 mos.	III	Ad. ca.		Not heard from
3	57	7 mos.	IV	Sq. ca.	30 mos.	
4	35	6 mos.	I	Sq. ca.	28 mos.	
5	60	6 mos.	II	Sq. ca.		14 mos.
6	55	12 mos.	IV	Sq. ca.		5 mos.
7	37	12 mos.	III	Sq. ca.	28 mos.	
8	29	4 mos.	II	Ad. ca.	28 mos.	
9	35		III	Sq. ca.		Not heard from
10	40		IV	Sq. ca.		8 mos.
11	57	12 mos.	II	Sq. ca.	26 mos.	
12		15 mos.	III	Sq. ca.	24 mos.	
13	37		IV	Sq. ca.		9 mos.
14	24		III	Ad. ca.		Not heard from
15	56		I	Sq. ca.	22 mos.	
16			III	Sq. ca.		Not heard from
17	55		III	Sq. ca.		11 mos.
18	68	16 mos.	IV			Not heard from
19			III			Not heard from
20	35		I	Sq. ca.	22 mos.	
20	Av. 47	9 mos.	3-I 3-II 9-III 5-IV	Sq. ca.	8 or 40%	6 dead 6 not heard from

a limited amount of radium (about 110 mg.) but in his enthusiasm he tried to do something for every case, with, as he believes, a resultant under-dosage. (2) Sections for pathologic examination were taken at every visit of the patient. He believes this procedure is a decided mistake and has abandoned it.

TABLE IV

RESULTS OF RADIUM THERAPY IN CASES OF CARCINOMA OF THE CERVIX TREATED DURING 1923 AND 1924 TO DATE

No.	Age	Duration Symptoms	Type	Living	Dead	Not heard from
42	Av. 52	Av. 11 mos.	II-IV 13-III 12-II 6-I	26 or 60%	6	10

TABLE V

RESULTS OF RADIATION IN CARCINOMA OF THE UTERUS
(Heyman, Stockholm.)

Symptom free five years after commencement of treatment			
Of 26 cases	1914	7	26.9 per cent.
" 40 "	1915	13	32.5 per cent.
" 47 "	1916	4	8.5 per cent.
" 63 "	1917	9	14.3 per cent.
" 41 "	1918	11	26.8 per cent.

TABLE VI

RESULTS OF RADIUM THERAPY IN RECURRENT CASES OF CARCINOMA OF THE UTERUS

No.	Age	Location	Operation	Recurrence	Duration of life since radiation	
					Still living	Dead
1	31	Cervix	Total hyst.	9 mos. after op.		9 mos.
2	45	Cervix	Total hyst.	6 mos. " "		12 mos.
3	40	Cervix	Percy cautery Total hyst.	3 mos. " "		9 mos.
4	55	Fundus	Total hyst.	4 mos. " "		12 mos.
5	55	Fundus	Total hyst.	6 mos. " "		12 mos.
6	55	Fundus	Total hyst.	4 mos. " "		1½ mos.
7	43	Fundus	Total hyst.	27 mos. " "	18 mos.	
8	46	Cervix	Total hyst.	5 mos. " "	4 mos.	

Table VI gives the results in a series of eight cases in which there was recurrence in the vault of the vagina following hysterectomy—in four cases for carcinoma of the fundus and in four cases for carcinoma of the cervix. In six of these eight cases, the average duration of life after radiation was nine and one-half months; of the other two cases the patients are still living, one eighteen months, and one four months after treatment. I feel that the percentage of cures in this group of recurrent cases will be very low as in such cases it is very difficult to administer sufficient radiation.

Table VII gives the results in a series of seven cases in which hysterectomy—with the Percy cautery in two cases—plus radium was used. Six of these seven patients are dead; the one remaining patient

TABLE VII

RESULTS OF SURGERY PLUS RADIUM IN THE TREATMENT OF CARCINOMA OF THE UTERUS

No.	AGE	LOCATION	OPERATION	COMPLICATION	DURATION OF LIFE SINCE OPERATION	
					STILL LIVING	DEAD
1	28	Cervix	Percy cautery. Total hyster. Radium	Vesicovaginal fistula		11 mos.
2	31	Cervix	Partial hyst. Radium and x-ray	none		15 mos.
3	29	Cervix	Percy cautery. Total hyst. Radium	Abdominal fecal fistula		8 mos.
4	60	Cervix	Total hyst. Radium and x-ray	none		16 mos.
5	57	Uterus Vagina	Supravag. hyst. Radium and x-ray	none		13 mos.
6	67	Uterus	Attempted vag. hyst. Radium	Vesicovaginal fistula		4 mos.
7	36	Cervix	Total hyst.	none	3 mo.	

was living three months after treatment but has not since been heard from. Because of these discouraging results, the use of surgery plus radium in the treatment of cancer of the uterus has been abandoned.

CONCLUSIONS

According to the statistics given in these tables, 33 per cent of the cases treated four or more years ago, 22 per cent of those treated three or more years ago, 40 per cent of those treated two or more years ago and 60 per cent of those treated less than two years ago are known to be symptom free. We feel that these results justify the continued use of radiation therapy for carcinoma of the cervix.

EAST NINETY-THIRD STREET AND EUCLID AVENUE.

(*For discussion, see p.* 711.)

A NEWLY MODIFIED METHOD FOR DETERMINING THE AREA OF THE PELVIC INLET BY X-RAY PELVIMETRY

By Herbert Thoms, M.D., F.A.C.S., New Haven, Conn.

IN 1922, the author described a method by which x-rays could be used in determining the outline of the inlet or superior strait of the pelvis.[1] Since that time we have used the method repeatedly in our work at Grace Hospital with uniformly successful results. At the present time, however, the technic formerly described has been considerably simplified by the introduction of a lead screen, the use of

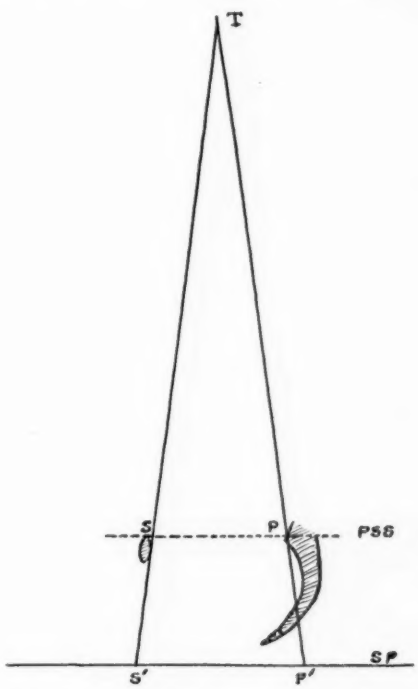

Fig. 1.—*T*, Target or tube; *PSS*, Plane of superior strait, *SP*, sensitive plate, *S*, symphysis; *P*, promontory of sacrum.

Note: If the plane of the superior strait is parallel with the sensitive plate, the rays from the target will project the outline of the superior strait to points *S'* and *P'* on the plate. The outline of the superior strait will be thus outlined equally enlarged in all directions. If a screen composed of squares, each representing a square centimeter, is placed in the same plane as the superior strait, it is obvious that the transmitted image will give the amount of enlargement of the superior strait. In other words, each square seen on the sensitive plate represents one square centimeter at the superior strait and readings may be made accordingly.

which is described below. This addition obviates the use of both the pelvimeter and the reducing-camera described in the previous communication.

The method as it is now being used is here set forth. The underlying principle is best understood by studying Fig. 1. It is obvious that if the plane of the superior strait is made parallel to the sensitive plate, an outline of this plane may be obtained upon the latter which will be enlarged equally in all directions. If after taking this picture we introduce in the exact position as that occupied by the superior strait, a screen composed of small squares of lead, each one centimeter square, we may project upon another sensitive plate a series of squares

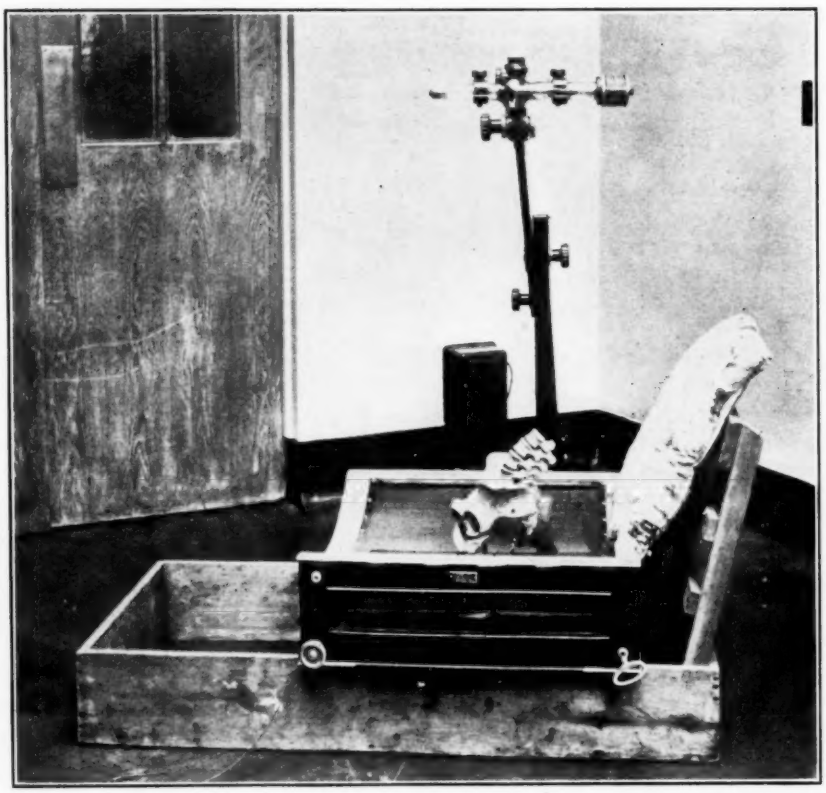

Fig. 2.

each representing one square centimeter at the plane of the superior strait. By viewing the two plates (or films) together in a view box, the area of the pelvic inlet in terms of centimeters becomes at once apparent.

The Position of the Patient.—This is best understood by studying Figs. 2 and 3. In the former a Bucky diaphragm is shown mounted on a chair-like frame upon which the patient sits. A bony pelvis is shown in the position occupied by the patient's pelvis and the tube or target is placed above the center of this. Fig. 3 shows the patient in

position for the exposure. It is necessary, however, to fulfill two conditions before the exposure may be made, namely, the superior strait must be made parallel or nearly so with the sensitive plate, and the distance of the superior strait from the latter measured. This is accomplished in the following manner: For purposes of identification a small tab of adhesive is placed on the patient's skin at a level with the upper border of the symphysis in the midline, and another tab in the depression under the spine of the last lumbar vertebra. It will be

Fig. 3.

remembered that an imaginary line passing through these two points follows the course of the anteroposterior diameter of the superior strait. The patient is now placed on the frame in the manner shown by the illustration. She is asked to arch her back as much as possible and it will be noticed that the posterior tab tends to become equidistant from the sensitive plate with the anterior tab. In other words the plane of the superior strait has become horizontal or nearly so. If the posterior point is slightly below the anterior point (which may happen in an occasional case) the result will not be measurably af-

fected. Careful measurements of the distance of these two points above the center of the Bucky diaphragm is now made. This is done in order that the screen may be set in the same plane for the second exposure which is explained later.

The Exposure.—It is quite obvious that with the patient in this position an unusual amount of tissue must be penetrated and, therefore, an exposure somewhat as follows must be employed. A seven inch spark gap is used. A superspeed film with the Bucky diaphragm is necessary. The tube is placed at least 36 inches above the latter and an exposure of 120 ma.sec. used. This latter varies somewhat, of course, with the size of the patient.

The Lead Screen.—It is apparent that if ordinary wire screen of centimeter mesh is used that the result on the sensitive plate would be a series of impermeable black squares through which nothing could be viewed. The problem, therefore, in the preparation of the screen is one of an opposite character. That is a screen composed of tiny lead or metal squares each representing a square centimeter. This

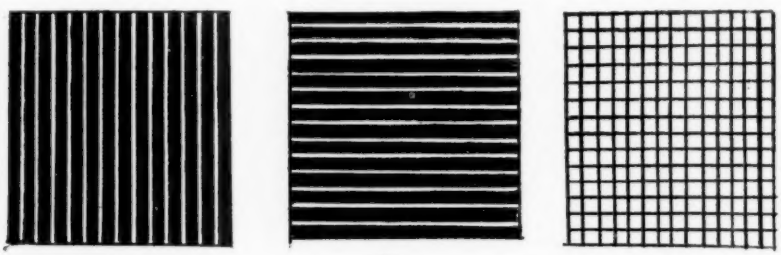

Fig. 4.

would be extremely difficult and is quite unnecessary. A board is mounted with lead strips so placed that the interspaces are exactly one centimeter apart (Fig. 4). It is obvious that if an exposure is made through the screen in position *A* and another exposure on the same plate made with the screen in position *B* the result on the sensitive plate will be that shown at *C*, namely, a series of lines enclosing squares each representing one square centimeter.

Use of the Lead Screen.—Following the exposure made of the patient's pelvis, the screen is placed over the Bucky diaphragm in the same plane as that occupied by the superior strait. This is determined by the measurements previously taken of the points marked by the adhesive tabs. That is the distance from the center of the diaphragm to each point when the patient is in positon for exposure. The exposure of the screen is as follows: Tube in same position as that for patient. Spark gap 3½ inches, slow film, each exposure ¼ second running 5 m. a.

The Results.—The two films are developed, dried, and viewed. The first film shows the outline of the inlet of the patient's pelvis equally

enlarged in all directions and the second film shows a series of lines encompassing a series of transparent squares. By superimposing one film on the other in the view box, the plane of the superior strait will be shown divided into squares each representing one square centimeter. The measurement in centimeters of the area or any diameter of the superior strait becomes at once apparent. (See Fig. 5.)

COMMENT

We have in the foregoing described a technic for measuring the superior strait of the pelvis which offers to the obstetrician many advantages over the ordinary methods of pelvimetry. An authority has

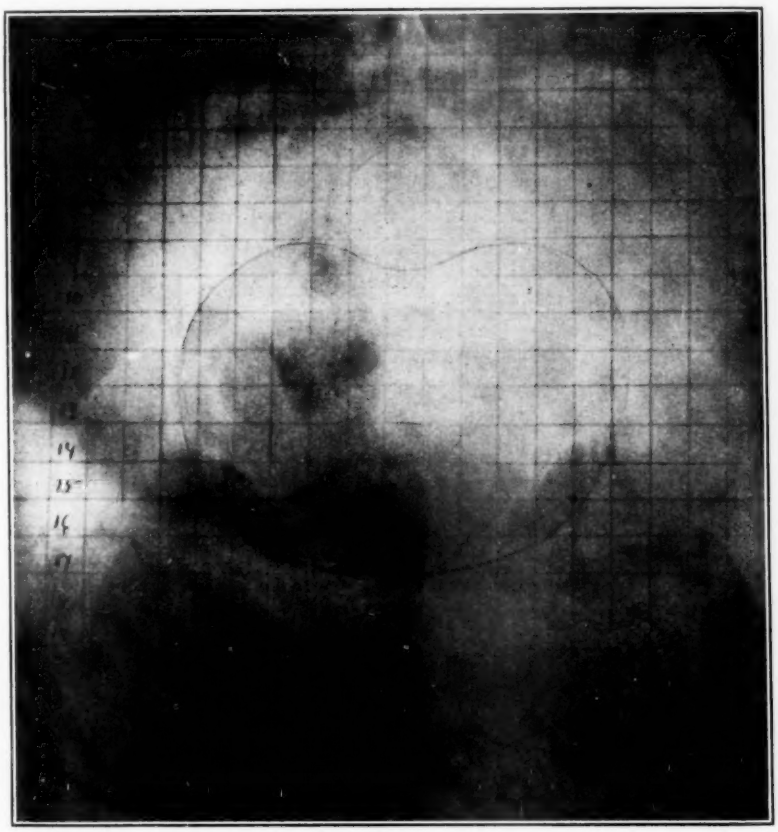

Fig. 5.

suggested that x-ray methods are not applicable in the latter months of pregnancy. This, however, has not been our experience as we have secured satisfactory pictures for mensuration even up to and including the last month of pregnancy. In this connection it has been suggested that the fetal head would interfere with obtaining a good outline of the pelvic rim. It will be remembered that with the patient

in the position here described the fetal head is much further away from the plate than when taking the ordinary anteroposterior picture. Furthermore, with the materially increased lime salt content of the mother's bones over that of the fetus it becomes apparent why in our pictures during the latter part of pregnancy the fetal head is often represented as not more than a very faint outline.

I have found the method of very great usefulness in women presenting themselves in early pregnancy with external measurements slightly under normal. It is in these cases at this time that exact knowledge of the area and shape of the pelvic inlet is greatly appreciated and it is in just these cases that one is so often surprised at the amount of pelvic room present.

It is apparent that such a screen may be used for other purposes of mensuration than that of the pelvic inlet or pelvic bones. At present we are working to use the technic in measuring the size of the fetal head, particularly the biparietal diameter in those cases which present slight or moderate overriding at term. At a later date in the near future these results will be published. In conclusion, I again wish to thank L. H. Wheatley of New Haven for the opportunity he has afforded in the use of Roentgenological Department of Grace Hospital and for his very valuable help in working out the exposures and points in x-ray technic with which I am unfamiliar.

REFERENCE

[1]Thoms, Herbert: Am. Jour. Obst. and Gynec., 1922, iv, 257.

59 College Street.

(*For discussion, see p. 715.*)

INSULIN AND GLUCOSE TREATMENT OF EXCESSIVE VOMITING OF PREGNANCY*

By William Thalhimer, M.D., Milwaukee, Wis.

(From the Laboratories of Columbia Hospital.)

THE use of insulin combined with the administration of glucose in the treatment of excessive vomiting of pregnancy, has been demonstrated previously[1] to rapidly alleviate the symptoms and acidosis in eight patients suffering from this condition. In this communication successful treatment with this method will be reported in two additional patients, making ten in all.

The rationale for this treatment has been stated in previous publications[1] but will be reviewed briefly. Patients with excessive vomiting in the early months of pregnancy develop a marked acidosis, in the sense that their blood alkali reserve is considerably lowered and severe ketonuria is present. This type of acidosis seems to cause nausea and vomiting, judging from experience with patients suffering from severe postoperative vomiting and acidosis. Inability to retain food itself causes a starvation acidosis, and the acidosis which is already present when these patients enter the hospital in the early months of pregnancy, is thereby intensified by the vomiting. If this is true, it constitutes a vicious cycle, and by eliminating the acidosis, the vomiting should cease. This has been accomplished by administering insulin hypodermically and glucose intravenously in ten patients.

It must be recalled that Titus, Hoffmann, and Givens[2] and Duncan and Harding,[3] working independently, have recorded excellent results from the administration of glucose alone, in large groups of patients having excessive vomiting of pregnancy. However, when insulin is given along with the glucose, vomiting ceases, and the patient's condition improves in a much shorter time than is stated in the papers of these investigators as a result of glucose therapy alone. The investigation of glucose therapy has been continued by Titus and by Harding, and each has elaborated in a somewhat different manner the theory that vomiting of pregnancy, either excessive or slight, is caused entirely by a deficiency of carbohydrates.

Harding and Potter[4] have shown in an extremely interesting study, that in these patients, the clearing up of ketonuria, and the reduction of the excessive urinary output of nitrogen occurs in about seven days, following the administration of glucose. Whether the "carbohydrate deficiency theory" alone is sufficient to explain the etiology of this condition, will depend on even more investigation than has

*Read at a meeting of the New York Obstetrical Society, February 13, 1925.

been devoted to this field. A number of interesting facts warrant this further study. Williamson[5] and others have shown that there is present throughout pregnancy a slight or moderate reduction of the blood alkali reserve; and Rowe, Banks and Alcott[6] have demonstrated a reduction of the tension of carbon dioxide of the alveolar air. The following ideas suggest themselves. Might these data indicate that in pregnancy there is a fundamental change in carbohydrate metabolism, and not merely a carbohydrate deficiency? Does the glycosuria in pregnancy following a small dose of phloridzin also indicate a change in carbohydrate metabolism, or only an increased permeability of the kidneys to glucose? Since excessive vomiting of pregnancy is a disease of early pregnancy, is the carbohydrate metabolism deranged until the beginning of the development of the fetal pancreas? These and other questions need investigation.

The discovery of insulin has not only made it possible to control diabetes, but has opened up many new problems on carbohydrate metabolism, and has afforded a means for the investigation of many of these problems. Nevertheless, even after many searching studies, the exact mechanism of insulin's action is not known. Even the relationship of insulin to the pancreas is obscure at present, since insulin has been found present in large amounts in various body tissues, and even in the tissues of individuals dying from diabetes. One must be careful, therefore, not to identify insulin too closely with the internal secretion of the pancreas. Whereas this seemed to be proved by Banting's remarkable discovery, later studies have made this an open question. But no matter what insulin is, or what the mechanism of its action on carbohydrate metabolism, it does control diabetes when properly administered. It also causes the disappearance of some types of severe nondiabetic acidosis even more rapidly than it relieves the coma of diabetes, and relieves these types of nondiabetic acidosis when given along with glucose more rapidly than glucose alone relieves them. Because of this, and because of the results achieved, the criticism that the treatment of excessive vomiting of pregnancy with insulin "is vague endocrine therapy," does not appear to be valid criticism. It is hoped that this method of therapy will receive the rigid test of trial by many obstetricians.*

For the time being, this treatment should be reserved for the extremely sick. These patients should be treated in hospitals only, and require incessant watching during the treatment by a competent nurse or interne. If there is a marked ketonuria, even if the determination of the blood alkali reserve is not possible, this treatment should be used. The blood alkali reserve should be determined, and in severely ill patients the carbon dioxide combining power of the plasma will

*Since this communication was presented, W. M. Le Fevre reported in the *Journal of the Michigan State Medical Society*, March, 1925, the successful treatment, with a modification of this method, of four patients with the milder degrees of vomiting of pregnancy.

be found to be between 35 and 40 volumes per cent (Van Slyke's method).* These patients are moderately or severely dehydrated, and are given intravenously, very slowly (during four to five hours), 1000 c.c. of 10 per cent glucose solution, or if severely dehydrated, 2000 c.c. of 5 per cent glucose solution. (Injection at this rate will not cause an increase in blood pressure above normal and perhaps no increase at all.) An apparatus has been devised which can be sterilized in an autoclave and kept ready for use.[7] The glucose solution should be carefully prepared from the highest purity glucose, and should be absolutely colorless, after it has been autoclaved.

Most patients do not object to lying quietly during the time the glucose is being given. One unit of insulin** is given for every three grams of glucose. For one hundred grams of glucose thirty units of insulin are given in divided doses, twenty units one hour after beginning the intravenous infusion of the glucose, and ten units after the second hour. This is somewhat less than one unit for three grams of glucose, but has never caused insulin shock, and has eliminated the ketonuria in from six to eight hours. Some glycosuria always occurs, but need cause no alarm, as it causes no renal damage. Some patients will fall asleep while the glucose is being given. Some who claim to have retained little or nothing for days will ask for nourishment while receiving the intravenous glucose, and will retain it. Some patients require only one treatment, whereas others require several. One must be guided in the frequency and number of treatments by clinical judgment controlled by examinations of the patient's blood and urine. Probably the most important points to be stressed are: to administer the glucose intravenously (since rectal administration is uncertain, and subcutaneous administration is apt to be painful); to be sure to give both enough glucose and enough fluid intravenously; and to give enough insulin.

CASE 1.—Mrs. H. S., aged twenty years, was admitted to Milwaukee Hospital April 17, 1924. She was six to eight weeks' pregnant. For three weeks she had vomited almost everything. Urine contained four-plus acetone on admission, and on the following morning. During the first eighteen hours she received 500 c.c. of 1 per cent glucose and soda bicarbonate *per rectum* by the drip method, also morphine, grains ⅙. The patient continued to vomit frequently.

The next morning the patient was seen in consultation by Dr. W. H. Shutter and was given 750 c.c. of 10 per cent glucose intravenously, beginning at 10 A.M., and insulin in doses of ten units at 10 A.M., 11 A.M., and at noon. She vomited once at 1 P.M., and not after that.

The urine examination, showed at 2 P.M., acetone one-plus, at 4 P.M. acetone one-plus, and at 9 P.M. reaction for acetone suggestive only.

The patient began retaining nourishment at 2 P.M., after which feedings were given at intervals of two to three hours, no further vomiting occurring. She

*Studies of hydrogen-ion concentration in the blood are now being made.

**Insulin-Lilly has been used in this investigation.

left the hospital in good condition five days later, and went through her pregnancy in a normal manner, with normal delivery of a normal baby.

CASE 2.—Mrs. V. G., patient of Drs. Carl Henry Davis and C. H. Stoddard, was admitted to Columbia Hospital at 8 P.M., January 12, 1925. The patient was thirty-two years old, a primipara, and about eight weeks' pregnant. Vomiting began one month before admission, rapidly became worse, and during the last few weeks she retained practically nothing. During this time she lost over thirty-six pounds in weight.

For years the patient had been subject to so-called bilious attacks accompanied by vomiting. She has had to be very careful in her choice of diet, and had a definite idea as to what foods would or would not agree with her.

Her condition when she entered the hospital was that of marked dehydration, with eyes deep sunken, and with deep circles about them, and she had a very anxious expression. Her pulse rate was 120, and the volume was small. The urine was loaded with both acetone and diacetic acid, giving a four-plus reaction for each of these, but did not contain albumin.

During the first fourteen hours the patient was given retention enemas of glucose solution with bromides. The patient vomited almost continously during the night, and the amount of acetone and diacetic acid in her urine the next morning remained the same. During the forenoon she was given 1000 c.c. of 10 per cent glucose intravenously, which was administered slowly, during five hours. At the end of the first hour 20 units of insulin were given hypodermically, and 10 units at the end of the second hour. By 8 P.M. acetone and diacetic acid had disappeared from the urine. The next morning four-plus amounts of acetone and diacetic acid were again present in the urine, and another treatment with glucose and insulin was given. This time 2000 c.c. of 5 per cent glucose were given instead of 1000 c.c. of 10 per cent, but the same doses of insulin were repeated. In six hours the urine was again free of acetone and diacetic acid. The patient's condition was considerably better. She lost the appearance of dehydration and her anxious look. Although she still vomited considerably, she retained orange juice and peptonized milk. At this time, because the improvement in her condition warranted it, an attempt was made to pass a duodenal tube so as to give feedings through the tube. This maneuver was controlled by the fluoroscope and the metal tip was forced back from the stomach into the esophagus not once, but several times. Glucose was not administered intravenously for forty-eight hours, although acetone and diacetic acid returned in the urine from time to time in two- or three-plus amounts. At the end of this forty-eight hour period, although the patient appeared definitely out of danger, she still vomited about one-third of her nourishment. On three successive days she was given 2000 c.c. of 5 per cent glucose intravenously, along with thirty units of insulin hypodermically. At the end of this time, the patient had a definitely healthy look, vomited only occasionally, and most of the time showed no urinary acetone and diacetic acid, although occasionally a one- or two-plus reaction was obtained. During this interval her diet was gradually being increased, keeping the fats low, about 70 grams per day, protein about 60 grams per day, carbohydrate from 200 to 250 grams per day.

The last day on which she vomited, was sixteen days after she entered the hospital, although for a number of days before this it seemed certain from various observations that we made, that there were only psychologic reasons for the vomiting. She had decided several days after treatment was begun that she could take only two and a half ounces of peptonized milk at a time. If we insisted on her taking the remainder of the three ounce feeding, she always

vomited. When the nurse brought her a four ounce feeding, but assured her that it was only three ounces, she would take three and a half ounces without vomiting. We believe that the patient had acquired a vomiting habit during her life, which was intensified during this illness. She was an extremely difficult patient to handle as regards feeding, and in many other ways. When she was admitted she was more desperately ill than any other patient with excessive vomiting whom we have treated with this method. Dr. Davis believed that if her condition had not improved, and if the acidosis had not been controlled, it would have been fatal to have induced an abortion. Although it took much longer than usual to cause a cessation of vomiting in this patient, nevertheless as early as twenty-four hours after treatment was started, her condition and appearance were so improved, that we no longer felt that she was desperately ill, and believed that had it been necessary, the uterus could have been emptied with safety.

The patient left the hospital four weeks after she had entered it, and now, one month later, has had no recurrence of vomiting, and is in excellent condition, her weight now being 124 pounds, a gain in weight since she left the hospital, but not yet up to her weight of 156 pounds before her illness.

REFERENCES

[1]Thalhimer, William: Jour. Am. Med. Assn., 1924, lxxxii, 696-699. Surg. Gynec. and Obst., 1924, xxxix, 237-239. Jour. Am. Med. Assn., 1923, lxxxi, 383-385.
[2]Titus, Paul, Hoffman, George L. and Givens, M. H.: Jour. Am. Med. Assn., 1920, lxxiv, 777-783.
Titus, Paul, and Givens, M. H.: Jour. Am. Med. Assn., 1922, lxxviii, 92-98.
Titus, Paul: AM. JOUR. OBST. AND GYNEC., February, 1922, iii, 209; May, 1922, iii, 559.
[3]Duncan and Harding: Can. Med. Assn. Jour., 1918, vii, 1057.
[4]Harding, V. J., and Potter, C. I.: Brit. Jour. Exper. Path., 1923, iv, 105.
Harding: Lancet, 1921, cci, 327.
[5]Williamson, A. C.: AM. JOUR. OBST. AND GYNEC., 1923, vi, 263.
[6]Rowe, A. W., Banks, H. L., and Alcott, M.D.: Am. Jour. Physiol., 1925, lxxi, 660.
[7]Thalhimer, William: Jour. Am. Med. Assn., 1922, lxxviii, 190-191.

(*For discussion, see p.* 716.)

THREE TYPES OF URETERAL PATHOLOGY WITH UNUSUAL CLINICAL FEATURES*

By Edward H. Richardson, M.D., F.A.C.S., Baltimore, Md.

MY theme has to do with ureteral pathology, a subject which I think merits the serious attention of everyone engaged in the practice either of obstetrics or gynecology. I am not qualified to speak authoritatively from the standpoint of the obstetrician, because I have never practiced obstetrics, but if there is any single conviction that stands out more clearly than all others from nearly twenty years of experience in the combined practice of gynecology, general abdominal surgery in women and female urology, it is that the training of specialists in this field should always include a mastery of female urology. My observation has been that the female urologic patient is far too often the surgically scarred patient. The women of this country have paid a staggering price in the sacrifice of gall bladders, appendices and ovaries, in addition to the annual toll of exploratory laparotomies for supposed adhesions, because the rank and file of surgeons still refuse to interpret with intelligence the intimate anatomic and pathologic relationship now commonly known to exist between the urinary and the reproductive systems in women.

Notwithstanding the substantial advance that has been made during recent years in our knowledge of ureteral disease, particularly in women, there still exists a widespread scepticism in the minds of the profession concerning certain phases of this subject. The explanation is to be found, I believe, in the fact that, while the accumulated records of clinical observations, ingenious diagnostic procedures and therapeutic successes are amply sufficient to meet the most exacting scientific demands, there is still a relative paucity of convincing pathologic data. It seems desirable, therefore, whenever the circumstances permit, to supply this deficiency. Hence my reason for the following brief report of three such instances.

Case 1.—In December, 1920, one week after a difficult panhysterectomy by the short method, performed by me at the Johns Hopkins Hospital for benign uterine disease, in a multipara, fifty years of age (Mrs. M. T.), there developed leakage of urine. Preceding this, there was a brief but sharp febrile reaction associated with pain of moderate severity referred to the left side of the abdomen. When accurate investigation became possible three weeks later, it was found that the leakage was coming from a tiny fistula in the scar at the vaginal vault. Failure of methylene blue solution introduced into the bladder to appear in the vagina showed that we were dealing with an ureteral fistula. The patient was permitted to leave the hospital in hopes that spontaneous closure might take place. This

*Read at a meeting of the Obstetrical Society of Philadelphia, December 4, 1924.

did not occur. Five months later she was readmitted to the hospital and a complete cystoscopic study was made. From this it was determined that the fistula was in the left ureter, 1.5 cm. above the bladder, and that with each peristaltic wave there occurred a simultaneous spurt of urine both through the fistula into the vagina and through the ureteral orifice into the bladder. Further investigation showed that the fistula area was involved in an extremely dense traumatic stricture which had so narrowed and distorted the ureteral lumen as absolutely to prevent the successful passage of any type of catheter, bougie, or filiform through the tortuous channel. A differential phthalein test, in which the excretion from the right kidney was obtained direct through a renal catheter and that from the left kidney partly transvesically and partly through the fistula, showed that the functional value of the left kidney was equal to that of the right, although the total of both was somewhat below normal. It was highly desirable, therefore, to save the left kidney, if possible, rather than follow the usual procedure in such cases and do a nephrectomy. On May 26, 1921, a plastic operation was undertaken for the purpose of closing the fistula and reestablishing the continuity of the ureteral lumen. Operative accessibility and adequate exposure of the fistula area were obtained by means of the Sims posture, preliminary widening of the vaginal orifice through deep incision of the perineum and traction sutures. A small opening was then made into the bladder adjacent to the fistula and ureteral orifice. It was then possible to free the ureter of the scar tissue surrounding it and thoroughly to dilate its bladder segment. A large renal catheter was passed through the urethra into the ureteral orifice and carried well up past the fistulous opening into the normal ureter beyond; thus reestablishing the normal channel. After mobilizing the bladder on all sides, it was then quite simple to invaginate the fistulous opening together with the distal ureteral segment into the bladder, the suture line being reinforced by approximating the vaginal wall over it. The ureteral catheter was left in for ten days. The wound healed kindly and the patient was discharged apparently cured three weeks after the operation. Five months later she returned for observation and a cystoscopic examination showed the left ureter to be functioning normally. A catheter was readily passed to the kidney pelvis, although there was present a demonstrable narrowing of the lumen in the old fistula region. She refused to have this dilated, however, and returned home. A recent letter from her states that she is having no symptoms whatever, referable to the left urinary tract. This case exemplifies the cure of an ureterovaginal fistula associated with a demonstrated traumatic stricture of the ureter.

CASE 2.—In the spring of 1923, Miss E. N., 23 years old, an undergraduate nurse in the training school of the Johns Hopkins Hospital, began to suffer from lumbar backache, which was aggravated by exercise. In July, 1923, while irrigating an osteomyelitis cavity, pus splashed into her right eye causing a conjunctivitis, which cleared up in 3 or 4 days under treatment. Two weeks later a furuncle developed on her chin and persisted for six days. Early in August, a second one developed on her right cheek and she was admitted to the surgical service of the hospital. This one also subsided in six days under conservative treatment. During her brief stay in the hospital, however, she had a questionable transient hematuria. Upon being discharged from the surgical service, she went to her home in Mississippi for four weeks. While there she developed a third furuncle on her face, which was incised by the local physician. In addition, throughout her stay at home she felt badly, ran a continuous fever, often up to 101° and on two occasions had night sweats. Three weeks prior to her second admission to the medical service of the Johns Hopkins Hospital on September 17, 1923, she developed a fourth furuncle on the right cheek. A culture from this

showed a pure growth of Staphylococcus aureus. In addition to the furuncle, the physical examination revealed a palpable right kidney with decided tenderness in the right hypochondrium and right costovertebral angle. These signs persisted with varying intensity throughout her eight weeks stay in the hospital. In addition she had frequent mild hematuria, a daily range of temperature from 96° to 101°, and one sharp attack of apparent renal colic on the right side. She was seen by a number of medical and surgical consultants. Tentative diagnoses of renal tuberculosis, Staphylococcus aureus infection, and renal calculus were made. But the blood count, blood cultures, and blood chemistry were negative. Repeated stains of urine sediment and inoculations of guinea pigs with the urine failed to support the idea of renal tuberculosis. The plain x-ray plate of the kidneys revealed no evidence of calculus nor of any other kidney abnormality. The phthalein excretion was normal. At this stage, I was asked to see the patient about the middle of October, 1923. I at once undertook a thorough cystoscopic study of the bladder and right urinary tract. This showed a perfectly normal bladder, bloody urine from the right side, and a definite narrowing at the bladder end of the right ureter; but no evidence of calculus, sterile urine from the right kidney, a renal pelvis of normal capacity, and a normal pyelogram. I, therefore, advised periodic dilatation of the right ureter. The patient was strongly opposed to this idea, however, and she continued on the medical service, presenting a continuance of the same symptoms and signs until she was discharged on November 11, 1923. Three weeks later she was admitted for the third time to the medical service, having had four sharp attacks of right-sided renal colic, followed by the passage of claret colored urine. Finally, on December 17, 1923, she was transferred to the gynecologic service, under my care with a recommendation of right kidney exploration. I fully concurred in the advisability of this course; but, feeling that exploration might reveal an indication for nephrectomy, I decided first to investigate the left urinary tract, in spite of the fact that at no time had it been under suspicion. At intervals of from ten days to two weeks, four successive attempts were made—the final one under general anesthesia—to pass renal catheters, bougies, whale-bone filiforms, and flexible metal sounds of varying sizes up the left ureter. Invariably each attempt failed, owing to the fact that an impassable stricture was encountered 2 cm. above the ureteral orifice, which was traversed by a channel so tortuous and narrow that it could not be successfully followed either by gentle or forcible manipulations. That a patent canal still existed, however, was shown by the spurt from the orifice at regular intervals of a fine jet of urine. It became necessary, therefore, to precede exploration of the right kidney by exploration and retrograde dilatation of the lower portion of the left ureter. On January 22, 1924, through an incision in the left lower abdominal quadrant, of the McBurney type, I exposed extraperitoneally the pelvic portion of the left ureter. It was encouraging to note that no evidence of hydroureter was present; but beginning at the point of its penetration through the basal portion of the broad ligament and continuing to the bladder wall, there was encountered an extraordinarily dense, cartilaginous-like, inflammatory process involving not only the ureter but also the periureteral sheath over a distance of approximately 3 cm. in continuity. A small longitudinal incision was made in the wall of the ureter just above the brim of the bony pelvis and a flexible blunt metal bougie passed down the lumen to the stricture area. Under guidance of the palpating fingers, it was then forcibly passed along the narrowed channel into the bladder and the entire stricture wall dilated. Exploration of the upper ureter by means of a bulbous catheter showed it to be normal. No attempt was made to close accurately the wound in the ureter. Only the periureteral tissues were lightly approximated over the opening and a drain introduced adjacent to this point, thus inviting a

temporary ureteral fistula. This promptly developed and with the free drainage of the left urinary tract thus established, a remarkably rapid improvement in the patient's general condition was noted. Three weeks after the operation transvesical catheterization of the left ureter was first attempted and successfully accomplished without much difficulty, the catheter being left *in situ* for four days to aid in reestablishing the normal channel and to promote closure of the fistula. This occurred five weeks after the operation. The stricture area was subsequently dilated twice and the patient discharged free from symptoms on March 9, 1924. She has since gained over twenty pounds in weight and for some months now has been carrying on her regular work in the training school. Since the operation on the left ureter she has experienced absolutely no recurrence of the renal attacks on the right side and has had no hematuria until about the middle of October when a very mild attack occurred. Prior to this, she refused to have further dilatations done, which I urgently advised. She has now consented, however, and the final stage of the cure is in progress. I wish to focus attention sharply upon the demonstrated pathology in the lower portion of the left ureter without symptoms referable to this side and upon the associated frequent attacks of right-sided renal colic and hematuria which promptly subsided upon reestablishment of proper drainage of the left side.

CASE 3.—In May, 1924, I saw in consultation at the Johns Hopkins Hospital, Mrs. L. J., a multipara, 43 years of age, upon whom a cystoscopic study was requested on account of a history strongly suggesting right-sided renal calculus. Twenty-three years previously her right kidney had been suspended. In June, 1920, she experienced her first attack of renal colic on the right side, which was of short duration and mild in character. No hematuria followed the attack and she was not conscious of having passed a stone. Subsequently she had frequent discomfort in the right lumbar region which became gradually worse until the end of the summer of 1923, when it had become severe enough materially to restrict her activities. After a period of rest in bed, she went on a Mediterranean cruise extending over several months, but each excursion ashore was followed by a sharp attack of renal colic on the right side, associated with chills, fever, and hematuria. She returned to New York early in May, 1924, and came at once to the Johns Hopkins Hospital, having been confined to bed during the previous month.

The general physical examination disclosed nothing of significance, except a right kidney approximately fifty per cent larger than normal, which was slightly tender. The x-ray, however revealed not only an unusually large right kidney but also a sharply outlined shadow, which was diagnosed stone in the right ureter just below the kidney pelvis. The phthalein excretion was normal. On May 12, I made my first cystoscopic examination. The bladder and ureteral orifice were normal. The right ureter was easily catheterized with a No. 8 renal catheter, carrying a wax tip, which passed to the kidney pelvis without meeting obstruction. The urine from this side was negative both microscopically and bacteriologically. The maximum capacity of the renal pelvis was only 4 c.c, which was surprising in view of the large size of the kidney. On removing the catheter the wax tip was unscratched. One week later, I catheterized both ureters, using a bismuth catheter on the right side. The differential phthalein test showed both kidneys to be functioning normally; but the pyelogram on the right side showed the stone shadow to be outside the ureter and a small but normal kidney pelvis situated well up on the upper half of the kidney shadow. I thereupon made a tentative diagnosis of double renal pelvis and double ureter, with a stone incarcerated at the ureteropelvic junction of the lower one. One week later, I made an attempt to demonstrate the lower pelvis by first filling the upper one and then

partly withdrawing the catheter and attempting to fill the lower one; but this was unsuccessful, the pyelogram again showing only the upper pelvis. Since only a single ureteral orifice could be found on the right side and the catheter invariably passed to the upper pelvis, further information could be gained only by exploration. This was undertaken on May 29, 1924. The kidney was exposed through the usual oblique lumbar incision. It was found to be fully fifty per cent larger than normal. After releasing dense adhesions to its dorsal and lateral surfaces, which resulted from the old suspension operation, the organ was with some difficulty delivered into the wound. On approaching its mesial border, an extensive inflammatory reaction was encountered and while separating the adherent fatty capsule, there occurred a sudden gush of clear fluid, which proved to be an extravasation of bromide solution and urine through a perforation in the upper pelvis. The adjacent tissues were edematous, discolored and unhealthy looking. Further dissection revealed the anticipated congenital anomaly of a double pelvis and double ureter. Incarcerated in the lower ureter and held fast by a sharply defined stricture at the ureteropelvic junction was a calculus, approximately 1 cm. in diameter. The two ureters were followed down a distance of 12 to 15 cm., but the point of their union was not accessible. A nephrectomy was done and the wound closed in the usual manner. The patient's convalescence was rapid and uneventful. Examination of the kidney after removal showed that the primary lesion was stricture of the lower ureter. This was complicated by an incarcerated calculus, by the congenital anomaly of double renal pelvis and double ureter, and by a marked perirenal inflammatory reaction.

In conclusion, I wish to point out that these cases furnish an actual demonstration of three types of ureteral stricture. The first was of traumatic origin, and was complicated by an ureterovaginal fistula; but the kidney was saved by successfully combining a plastic operation with proper dilatation of the stricture area. The second case illustrates the common type of inflammatory stricture in aggravated form, involving the lower ureteral segments and presenting the interesting clinical picture of recurrent attacks of renal colic on the side with scarcely perceptible damage to the urinary tract. Here again cure was effected by proper dilatation of the stricture areas. The third case presented a puzzling diagnostic problem, which happily was solved prior to the operation. It illustrates, in addition to the interesting congenital anomaly, an inflammatory stricture at the ureteropelvic junction, which led to the formation and incarceration of an ureteral calculus and associated pathology requiring nephrectomy. The demonstration of ureteral stricture in each instance as pathologic entity is absolute.

(*For discussion, see p.* 721.)

PSEUDOCARTILAGINOUS CYST OF THE OVARY*

By Wm. Edgar Darnall, A.M., M.D., F.A.C.S., Atlantic City, N. J.

MY only apology for reporting this case is the unusual character of the pathology of the tumor removed from B. J., aged sixty-eight, a mulatto woman who was sent into the wards of the Atlantic City Hospital. Her mother died of typhoid fever, her father of paralysis. Her own clinical history was negative. She did not remember having been sick. She had had three children, no miscarriages but had always suffered more or less from leucorrhea. Her menses appeared at the age of twelve, were always regular, every twenty-eight days, lasting three days and without pain. She slept well, appetite good but digestion poor. There was a trace of albumin in the urine, no casts but about 40 leucocytes to the field. The kidney function on admission was 21 per cent (phthalein test), otherwise the urine was normal. The blood showed hemoglobin 70 per cent, color index 0.8, red cells 4,020,000, white cells 9,300, polymorphonuclears 72 per cent and a faintly positive Wassermann 1+. Blood urea 27.3.

The vaginal outlet was normal, cervix atrophied, uterus small. There was a mass in the lower right quadrant and the woman complained of severe pain in this region. The temperature and pulse were normal. Operation revealed a right ovarian cyst about the size of a cocoanut, partly twisted on its pedicle. There were many daughter cysts of varying sizes and of more or less yellowish color. The left ovary appeared normal, the appendix kinked and involved in adhesions.

The cyst was removed as well as the appendix. The walls of this cyst in many places were quite thin, not more than 0.2 cm.; at other places the thickness reached 2 cm. These thickened areas consist of fibrous tissue along with cartilaginous or almost bony tissue very difficult to cut, giving a rough sensation to the knife as if calcified. They reminded one, in elasticity and hardness, very much of a fetal head of three or four months' and when cut showed spicules of hardened tissue similar to cartilaginous bone. The lining of the cyst inside was quite smooth. A few trabeceulae were present running from one part of the side of the cyst to the other, otherwise the inside of the cyst was smooth. The cyst wall consisted equally of the thin and the thick structures as mentioned. Along with the thickened areas were found many smaller cysts from the size of a cherry seed to that of a pigeon egg. The inside lining of some of these smaller cysts was roughened

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and hard and felt like true bony tissue. The content of the cyst was brownish in color. There were no organisms found and there were no elements of a dermoid character.

Dr. John A. Kolmer, of Philadelphia, reported that "The cyst shows the histologic structure of a fibromyxocyst adenoma of the ovary without malignancy. The tube attached shows a chronic nontubercular salpingitis."

The specimen was studied in more detail by W. M. L. Coplin of Philadelphia, who reports as follows:

The following histologic report is based on the study of seven slides embracing thirteen sections from different and various parts of the gross specimen, examined after appropriate fixation, paraffin infiltration, cutting, and suitable staining:—

For purposes of description the following may be designated:—

(a) The septal, sustentacular or intercystic tissues.

(b) The lining of the cyst cavities.

(c) Attached fragments of cyst contents.

(a) The septal, sustentacular or intercystic tissues. These, for the most part are composed of collagenous elements, mostly fibrous but also containing what appear to be a few strands of elastica. The fibrous tissue is mostly of coarse strands of fully developed elements but finer fibers and fibroblastic cells are also present. A few fibers of unstriped muscle have also been encountered. In some of the septa notable separation of bands, vacuolated areas and hydropic cells suggest an associated edema not, however, intense. Hemorrhages, both recent and old, are also present; some of the former contain fibrin and erythrocytes in various stages of disintegration; the older hemorrhages contain pigment, and manifest absorption and fibrous replacement are in progress. One of the more recent bleedings has extended into a cyst cavity forming a clotlike stratum flattened against the cyst wall.

At one point in the interstitial tissue, immediately adjacent to an adenomatous collection forming a part of the lining membrane, collections of cells believed to be epithelium, apparently morphologically identical with those cells lining some of the smaller cysts, are growing independently of surface attachment. This is interpreted as an evidence of a tendency to lawless invasion of the connective tissue and, therefore, as potentially, if not actually, carcinomatous. The change has been sought in all sections but encountered in only one; even there it cannot be said to be indubitably cancerous, although this inference appears justified.

At one point the interstitial structures are granular, possibly necrotic with suggestion of calcification, although lime salts have not been demonstrated histologically.

In the septa also are the blood vessels, some of which are of considerable size. An artery shows very notable, even advanced sclerosis and one sclerotic vessel contains a small organizing, occluding thrombus evidently of recent formation.

(b) Lining of the cyst cavities: Some process, possibly atrophy, necrosis, trauma or other, has removed any lining epithelium that, at one time, may have been present in some of the cysts. At points, however, in the larger cysts and more abundantly in the smaller ones, residual cells are clearly demonstrable; these are commonly of the low columnar or cuboidal type, frequenty flattened, staining badly and almost, if not quite, necrotic. At one point epithelial growth and gland-like arrangement of the new elements are in progress. Here the cells stain deeply and the inference that the process is active and progressive may be

justified. It is just at this place that the possible invasion of the deeper (intercystic) structures, mentioned above, is demonstrable.

(c) Attached fragments of cyst contents. To some of the walls of larger cysts attached fragments of what may be construed as residual contents of the cysts can be recognized. These fragments are, in some instances, hyalin or homogenous, suggesting colloid; again the attached matter is clearly blood or apparently of blood origin,—a residue of some past hemorrhage. Polymorphonuclear leucocytes or other evidence of infection and suppuration have not been encountered.

Diagnosis and remarks:—Clearly the mass is a multilocular cystadenoma showing evidence of interstitial inflammation and repair, and, because of the extravasated blood, has possibly been subjected to some minor trauma. Adenomatous growth and extension are obvious and it is possible, indeed probable, that an early stage of definitely malignant transformation is in progress. Papillary hyperplasia has been sought for but not demonstrated; in one of the cysts what was thought to have been a papillary growth was, on histologic examination, found to be blood, disintegrating and necrosing on the aspect facing the cavity and possibly organizing where attached to the cyst wall.

5 South Morris Avenue. (*For discussion, see p.* 710.)

RUPTURE OF THE UTERUS, WITH A REPORT OF TWO CASES WITH RECOVERY FOLLOWING HYSTERECTOMY*

By James Knight Quigley, M.D., F.A.C.S., Rochester, N. Y.

RUPTURE of the uterus occurs about once in a thousand cases of pregnancy. The prognosis is always grave. In the complete form before the advent of modern surgery the mortality was probably at least 90 per cent and even today it has been given as high as 70 per cent for complete rupture and 25 per cent for the incomplete form, with a fetal death rate of 85 to 90 per cent. The prognosis is dependent upon the extent of the tear, the amount of manipulation that preceded it, the prompt availability of good surgical care including adequate hospital facilities, the length of time that elapses between the rupture and the use of appropriate treatment.

Prophylaxis is the best treatment, for prompt conservative delivery in a case of beginning contraction ring dystocia will prevent many ruptures. One should wait for or secure full cervical dilatation before any attempt is made at delivery, and not attempt version in a uterus with a thinned-out lower segment with some retraction of Bandl's ring. One should be very careful in the use of pituitary extracts before the termination of the second stage of labor. While the dictum "once a cesarean always a cesarean," may not meet with universal favor, nevertheless, the 5 per cent proportion of uterine rupture as

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against the very low mortality in elective section today, leads me to be very reluctant to subject any uterine scar to labor. With the increasingly large number of low cervical sections done, we will probably see fewer postcesarean ruptures.

The treatment of incomplete ruptures in which the hemorrhage is often limited and where delivery is already effected is easy to outline. Morphine, ice-bags, ergot, perhaps packing with gauze is used, with transfusion if necessary. These cases, particularly if a large arterial branch is involved, will sometimes improve only to have more hem-

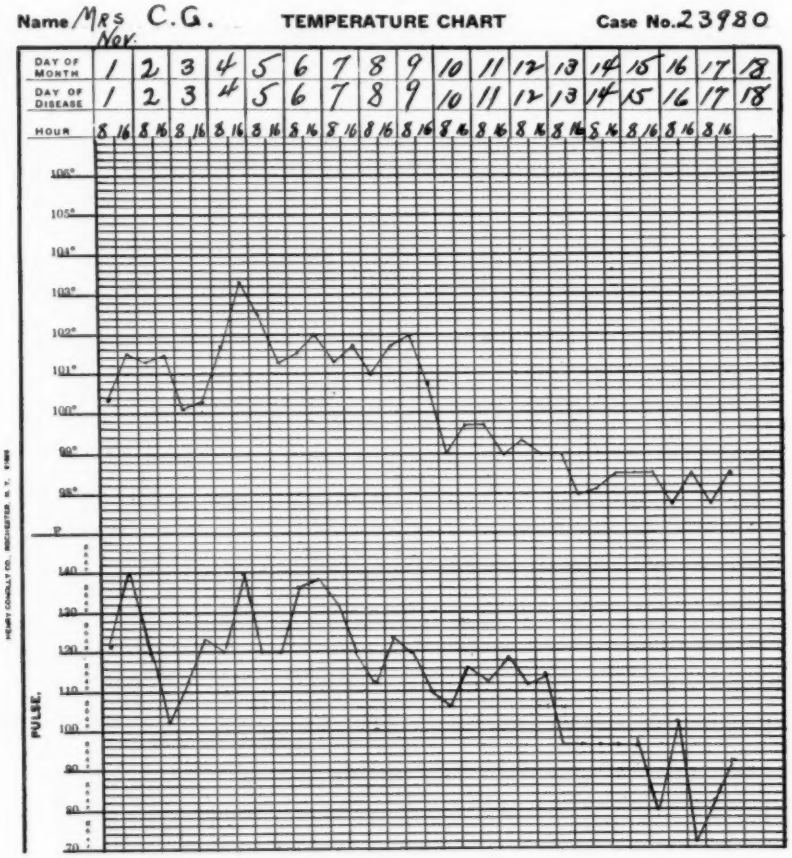

Chart 1.

orrhage, perhaps after days. Laparotomy in the interval after a transfusion may be necessary. Some of the ruptures extending upward from the cervix can be repaired by suture from below. In the complete variety, the so-called tragic case, the treatment depends upon the condition of the patient. If after blood pressure and hemoglobin determination, it seems that a laparotomy is justifiable, then transfuse, open the abdomen, deliver the baby from the abdomen or uterus, and if there is no reason to suspect infection and the rent is not too ex-

tensive or its edges too ragged to preclude good repair, close by two layers of sutures; if because of frequent examinations or attempts at delivery the case is under suspicion, remove the uterus as rapidly as possible.

Tweedy and Wrench of the Rotunda deprecate laparotomy in cases of complete rupture. They advise delivery of the child from below even though it is necessary to deliver through the rent in the uterus. Following delivery they loosely pack with gauze the rupture in the uterus. To attempt breech delivery from a uterus already ruptured

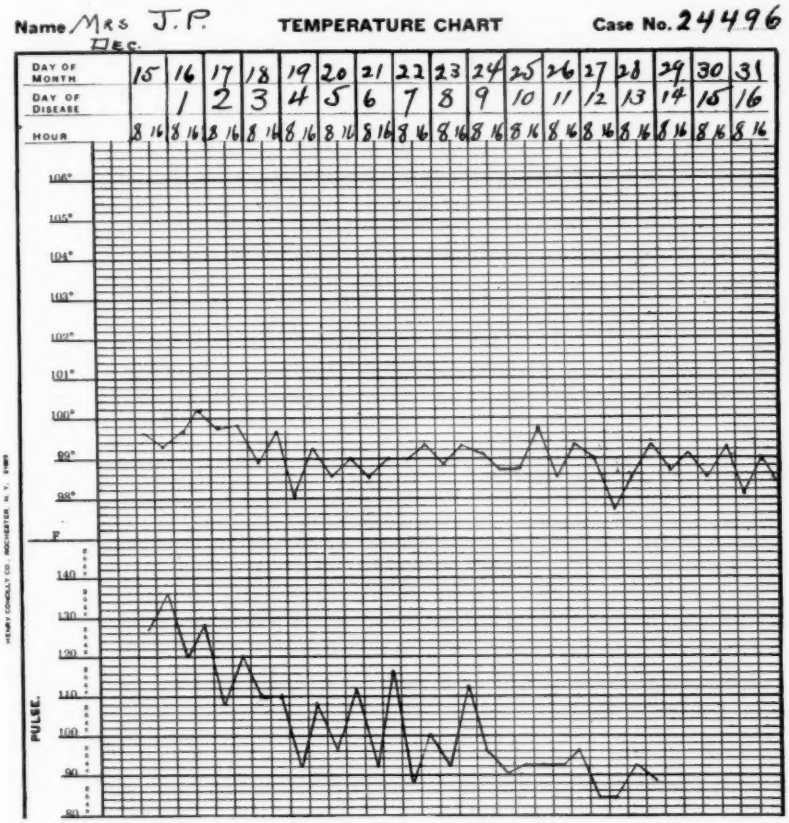

Chart 2.

seems illogical, the rent may be enlarged and the uterine artery torn, to say nothing of prolapse of bowel; again, if it is sometimes difficult to control postpartum hemorrhage by tight intrauterine tamponade, is it possible to stop bleeding from torn vessels by a light pack where counterpressure is not operative? Berkeley and Bonney of London, however, recommend for a complete rupture, that is, one involving the peritoneum, an immediate laparotomy, with suture of the uterus if possible, if not, hysterectomy. Most American obstetric surgeons recommend this course.

CASE REPORTS

CASE 1.—Mrs. C. G., Rochester General Hospital, admitted 11:20 P.M., October 31, 1923, Italian by birth, thirty-two years of age. She has lived in the United States eleven years; has been married nine years and has had eight pregnancies. She says she has never been ill.

Obstetric history: This was her eighth pregnancy, four having terminated prematurely at two, three, four and six months from causes not known; of the three fullterm pregnancies, the first terminated in a forceps delivery with a stillborn child, the second was a normal spontaneous delivery of a living baby, the third full term pregnancy also resulted in a living child after a short easy labor.

The present pregnancy was uneventful, the patient was supposed to be at full term though she did not menstruate between her last two pregnancies. Labor had been in progress about twenty-seven hours on admission. After having had pains sixteen hours, she was seen by her physician who, having assured her everything was all right, went away, and returned eight hours later and gave her a hypodermic. As no progress was noted, he attempted forceps delivery and after failing, sent her to a hospital.

When admitted the patient was in severe and almost continuous pain, the abdomen was very hard and there were two distinct tumors present, the lower one reaching to about two finger breadths below the umbilicus. The fetal heart was not heard. (A good description of a retracted Bandl's ring quoted from interne's notes.) Vaginal examination showed the cervix fully dilated and the vertex presenting in the L. O. P. with no engagement and general condition good. The pulse was 84, regular and of good quality. When seen by the writer about twenty-five minutes later the patient presented an entirely different picture—the skin was pale, cold, perspiring, pulse 120; abdomen with doughy feel, no contraction ring felt, no presenting part was felt on vaginal examination. There was slight external bleeding. The patient was prepared for operation. She was given 800 c.c. of normal saline intravenously, and during the operation 450 c.c. of citrated blood. Upon opening the abdomen there was a gush of blood and the baby was found free in the abdominal cavity. It weighed nine and one-quarter pounds and was delivered with the placenta. The uterus was well contracted and practically empty, the rent was a transverse one in anterior surface of the lower uterine segment. A supravaginal hysterectomy was done and one tube was inserted for drainage. The patient's condition was desperate throughout the operation, with a pulse rate of 144 to 156 and of poor quality.

At 8:40 A.M., seven hours after, the patient's condition was poor, the pulse irregular and its rate was 144. The blood pressure was 118/80 and there was slight cyanosis. Twelve hours later the pulse was of much better quality (116 to 120) but the patient breathed heavily and many moist râles were heard over both sides of the chest. Three hundred c.c. of citrated blood were given intravenously. For the next week she had a rather stormy time with a bronchopneumonia but presented no abdominal or pelvic complications whatever and was discharged on the twenty-fifth day.

Salient points in this case:

1. A worn-out uterus.
2. Persistent posterior position, responsible jointly with pituitrin for a contraction ring dystocia.
3. The value of transfusion preparatory to or during the operation.

CASE 2.—Mrs. J. P., Rochester General Hospital, admitted 9:30 P.M., December 15, 1923. Italian, forty-two years of age. General personal history irrelevant and an obstetric history of the first five pregnancies being normal, terminating in

spontaneous deliveries; sixth complicated by placenta previa for which an abdominal delivery was done in this hospital in 1917.

Two years later in her seventh labor she summoned a physician who, finding full dilatation and a head low in the pelvis, delivered by low forceps. During the present, or eighth, pregnancy she says she has felt perfectly well and does not remember the date of her last menstruation but estimates she is at term. Her pain began about 6:30 P.M. the night of admission to the hospital. She had had no prenatal attention and called a physician after the onset of labor. He responded in a short time and found that pains were of about ten minute intervals. He left and returned in two hours and then made a vaginal examination and found two fingers dilatation and the vertex L. O. A. position. During the visit the physician said the patient had two cyanotic spells and because of this he sent her to the hospital.

On admission to the hospital three hours after the onset of labor, the patient was very pale, dyspneic, and asking for water. Very restless and tossing about. The lungs showed a few moist râles over the base. The heart was very irregular (100 at first but rapidly increasing to 120). The blood pressure was 50/32 at first but one-half hour later it was 92/50. At times the radial pulse was imperceptible. There were no cardiac murmurs. The abdomen was soft and doughy. The uterine contractions were not felt. Vaginal examination showed bleeding from the vagina which was bright and too brisk for antepartum bleeding. The cervix was dilated but no presenting part was felt. A diagnosis of ruptured uterus was made. The patient was immediately prepared for operation. One ampule of digitan was given intravenously. Four hundred c.c. of the husband's citrated blood were transfused during the operation. A midline incision from the umbilicus to the pubis was made and considerable blood was found on opening the peritoneum. The placenta presented in the abdominal wound and was delivered. The dead infant weighed eight pounds and two ounces and was free in the abdominal cavity.

The uterus was quite low and contracted but was not bleeding actively. There was a ragged gaping wound in the upper segment of the uterus at the site of a cesarean scar. A supravaginal hysterectomy was done using clamps. A tube with wick drainage was placed in the wound. The postoperative condition was unusually free of symptoms. The blood count on the day following operation was: reds 2,390,000, leucocytes 16,500, hemoglobin 32 per cent. Two days later the patient was given 250 c.c. of blood. She was allowed out of bed on the fifteenth day and was discharged on the eighteenth day. The second case illustrates the fallacy that though a sectioned uterus may go through one or more labors safely it will always go through another.

These patients were unusually free from vomiting, distention or indication of infection which leads the writer to believe that the large involuting uterus is quite a factor in a smooth convalescence. The value of transfusion was demonstrated in both cases. Hysterectomy was done in the first case because delivery had been attempted and a probable fatal sepsis would have followed an attempt to conserve it. Hysterectomy was done in the second case because of the nature of the wound in the uterus and the difficulty in securing a good scar. Both cases presented contracted uteri which leads one to believe that the prognosis of uterine rupture is better when the organ empties itself entirely into the uterine cavity.

REFERENCES

Langrock, Edw. C.: Am. Jour. Obst. and Gynec., iii, 656.
Jung: Deutsch med. Wchnschr., April 6, 1923.

293 Alexander Street.

(*For discussion, see p.* 709.)

THE SHORT UMBILICAL CORD AS A FACTOR IN DYSTOCIA*

By Theodore W. Adams, M.D., Portland, Oregon

(From the Department of Obstetrics and Gynecology, University Hospital, Ann Arbor, Michigan.)

IN REVIEWING obstetric literature for the past twenty years one is struck by the number of cases reported, wherein dystocia or fetal asphyxia is attributed to the shortness of the umbilical cord. That such a complication may and does occur cannot be denied. However, looking at this condition as it is met in the daily run of obstetrics, one is not convinced that it is an important factor in either dystocia or fetal asphyxia.

It was, therefore, decided to study the case records of the Maternity Clinic of the University of Michigan Hospital in an attempt to obtain further information as to the effect of a shortened cord on labor. The study embraces 604 consecutive deliveries in which pregnancy had advanced beyond the age of viability. There were 112 cases (16.9 per cent) where the cord was either actually short or coils of cord were present around the fetus. For the purpose of comparison 187 vertex deliveries where no coils existed and where the cord was of normal length were also studied.

The average length of the cord has been found to vary from 34 to 48 cm. as given by Nägele[4] to 50 to 60 cm. as recorded by Lariot.[3] von Winkle[7] in his *Handbuch der Geburtshülfe* states that in general the length of the umbilical cord is approximately equal to the length of the fetus. That is, for a full term fetus the length of the cord would be about 50 cm.

Mathematically Gardner[2] has shown that for a normal full term child to be born without any traction on the umbilical cord, the latter must measure at least 32 cm. He arrived at this conclusion by measuring the distance from the vulva to the fundus. This distance he found to be 32 cm., while Tarnier's figure for the same distance is 35 cm. However, the slack in the cord is not taken up until the umbilicus is passing through the vulva. The fundus at this time has descended somewhat so that the vulvofundal distance is 28 cm. In a small series of cases at the University Maternity Ward where these measurements were taken, the figures coincided closely with those of Gardner. Of course, as pointed out by von Winkle, it makes an appreciable difference in the length of the cord necessary if the placenta is implanted below the fundus of the uterus.

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On the other hand a cord measuring over 28 cm. might be so coiled about the fetus as to materially shorten its available length. The average distance from the umbilicus around the neck and back to the umbilicus of a full term child averages 34.5 cm. Thus a cord which is looped once around the neck would have to be 62.5 cm. to give an available length of 28 cm. Were there a coil around the neck in addition to the loop another 17 cm. or the average circumference of the neck, would have to be added, making a total length of 79.5 cm. The cord less than 28 cm. with or without coils has been termed an actually short cord, while a cord so looped or coiled about the fetus as to make its available length less than 28 cm. is classed as an accidentally short cord.

Of the 112 cases of shortened cord there were 4, or 0.7 per cent, which fell into the group of actually short cord. These cords measured 17, 22, 27, and 27 cm. There were 108 cases or 16.2 per cent where there was at least one coil of cord about the fetus. However, 44 of these cords were of sufficient length to give an available length of 28 cm. despite the coils around the fetus. There were, therefore, only 68 or 11 per cent of cases where the cord was sufficiently short theoretically to cause dystocia.

Of the cases of accidentally shortened cord there were 44 instances (68.7 per cent) where there was one loop of cord around the neck, 17 (26.5 per cent) where two loops were present, and in three cases (4.7 per cent) there were three coils around the neck. The average length of the cords when one coil was present was 52 cm. or 10.5 cm. less than theoretically would be required to allow birth to take place without traction on the cord, were the placenta implanted on the fundus of the uterus. In the cases where two or three coils were present the average length of the cords was 61 and 87 cm. respectively. That is, in the former cases the cords were theoretically 18.5 cm. and in the latter 11.5 cm. too short to allow birth to take place without dystocia.

If dystocia were to take place, one would naturally expect that it would occur during the second stage of labor as it is at this time that the short cord would interfere with the expulsion of the child. The length of the second stage in this type of case should, therefore, be prolonged. This, however, was not the case. The average length of the various stages of labor in cases of shortened cord as compared with those in which the cord was of normal length is shown in Table I.

The total length of labor for primiparae was 14.3 hours in normal cases as compared with 13.3 in cases with short cords. The second stage or the stage where the greatest effect of the short cord would be expected was 1.9 hours in both types of cases in primiparae while in multiparae the second stage was 12 minutes less in those cases where the cord was shortened. In this series of cases a short cord did not lengthen either the second stage or the total length of labor.

TABLE I

COMPARATIVE LENGTHS OF LABOR

	CASES WITHOUT SHORT CORD (187 CASES)				CASES WITH SHORT CORD (68 CASES)			
	168 Cases				62 Cases			
Spontaneous Deliveries	1st Stage Hr.	2nd Stage Hr.	3rd Stage Min.	Total Hr.	1st Stage Hr.	2nd Stage Hr.	3rd Stage Min.	Total Hr.
Primiparae	12.2	1.9	13	14.3	11.3	1.9	15	13.3
Multiparae	5.8	1.0	16	7.0	8.3	0.8	12	9.3
Forceps Deliveries	20 Cases				6 Cases			
Primiparae	28.0	3.5	14	31.7	29.8	3.0	6	31.7
Multiparae	16.0	4.5	10	20.0	29.0	2.0	9	31.2

There were nine cases of theoretically short cord in which the length of the second stage was over three hours. Six of these had definitely funnel pelves of sufficiently severity to account for the second stage dystocia. There were then only three cases (0.2 per cent) out of 604 consecutive deliveries where the short cord may have been the etiologic factor in prolonging the second stage.

Were short cords capable of hindering advance in the second stage, it might readily be expected that the percentage of operative deliveries would be higher in this type of case. This seems logical because there is no reason to believe that other factors leading to forceps extraction, such as contracted pelves or posterior positions, would not be found just as frequently among cases of short cord as with cords of normal length. There would be then all the indications for operative delivery common to both types of cases plus the dystocia due to the shortened cord.

In the present series of 68 cases of short cord, forceps deliveries were indicated in 8.3 per cent of cases, while in 187 vertex cases without short cord, operative delivery by forceps was indicated in 10.7 per cent of cases. Short cord did not increase the percentage of operative deliveries.

The danger with which a short cord would be expected to threaten the child would be either asphyxiation due to impairment of the fetal circulation, or hemorrhage from a rupture of the cord. Rupture of the cord, as pointed out by Stowe,[5] occurs as the result of a sudden jerk far more frequently than as the result of the gradual pressure exerted by the uterine contractions. In the present series there was no instance in which rupture occurred. The effect on the fetal circulation can best be obtained by a comparison with the cases in which there was no shortening of the cord. Table II gives this comparison. In 68 cases of shortened cord the fetus was stillborn in 2.9 per cent of cases, showed evidence of livid asphyxia as described by Williams[6] in 13.3 per cent, and was perfectly normal at birth in 83.8 per cent. In each of the two cases of stillbirth there was no fetal heart heard on

entrance to the clinic early in labor. One was a premature birth at seven and one-half to eight months and showed quite definite placental infarction. It is possible in the other case that the coil of cord around the neck in some way embarrassed the fetal circulation sufficiently to cause death. However, the birth in this case was spontaneous and the cord did not seem to offer either traction or obstruction. As compared to this, in 187 cases of vertex presentation in which the cord was not short, the fetus was stillborn in 4.8 per cent, showed livid asphyxia in 14.9 per cent, and was normal in 80.3 per cent. That is, the fetal mortality and morbidity rate was no greater in cases of shortened cord than in cases where the cord was of normal length.

TABLE II. COMPARATIVE MORTALITY OF FETUS

	STILLBORN		LIVID ASPHYXIA		NORMAL	
	No. of Cases	Per Cent	No. of Cases	Per Cent	No. of Cases	Per Cent
Cases with short cord (68 cases)	2	2.9	9	13.3	57	83.8
Cases without short cord (187 cases)	9	4.8	28	14.9	150	80.3

The greatest danger to the mother lies in the constant tension to which the placental surface is subjected, thus tending to cause a partial premature separation of the placenta. The average loss of blood in 147 vertex presentations with normal length cords was 288 c.c., as compared with an average loss of 568 c.c. in 68 cases where the cord was short, or the average amount of blood lost was almost twice as great in cases where the cord was short.

Williams[6] places the lower limit of what may be considered a postpartum hemorrhage at 600 c.c. In this series a loss of more than 600 c.c. occurred 12 times, or 17.2 per cent, in the cases of short cord. In 147 cases of normal length cords, bleeding to the excess of 600 c.c. occurred 7 times, or 4.8 per cent. However, there was no maternal mortality and although this is a danger which must be taken into consideration it does not mean that, except in the exceptional case, it is an indication for operative interference.

By the foregoing statements it is not meant that a short umbilical cannot, rarely, be the cause of serious dystocia. A casual review of the literature will quickly convince one that such cases do, occasionally, occur. However, they are rare. In by far the greater majority of cases a short cord causes neither dystocia nor danger to the fetus or mother; and although this condition exists as a potentially dangerous complication, it only rarely necessitates operative interference.

REFERENCES

[1]Brickner: Am. Jour Obst., 1902, xlv, 512.
[2]Gardner: Surg. Gynec. and Obst., 1922, xxxiv, 252.
[3]Lariot: Bull. Soc. d'obst. et de gynéc. de Par., 1924, xiii, 256.
[4]Nägele: Quoted by Lariot.
[5]Stowe: Tr. Chicago Gynec. Soc., 1901-1902, p. 209.
[6]Williams: Text-book of Obst., 1923, ed. 5, New York, pp. 940, 969, D. Appleton and Co.
[7]von Winkle: Handbuch der Geburtshülfe, 1903, i, Part I, p. 300.

A NEW UTERINE CANNULA FOR USE IN THE RUBIN TEST

By Ernest Gladstone, M.D., New York, N. Y.

THIS cannula was devised to take the place of the Keyes-Ultzmann cannula in the Rubin apparatus for tubal insufflation in sterility.

The cannula (Fig. 1) is 10 inches long and is made of nickel plated brass. The end that is inserted into the uterus coincides with the curve of the cervical canal and is perforated at the tip by several small apertures. The handle of the instrument is bent down (*C*) at an angle of 45°, has a stopcock inserted (*B*) and terminates in a nipple (*A*) for attaching the rubber outlet tubing of the flow-volumeter. A rubber urethral tip (*E*) is fitted over the cannula and is held secure, in any desired place, by a metal cylindrical stop (*D*).

Diagrams Nos. 1, 2, and 3 show horizontal sections of the stopcock, in the three possible positions of the handle. These sections also point

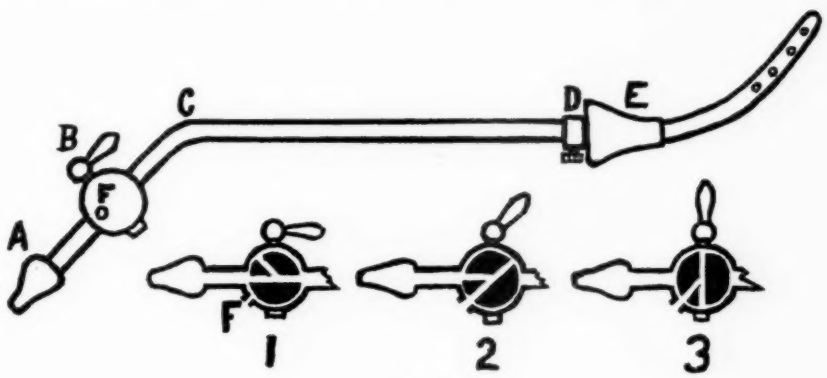

Fig. 1.

out the two channels of the valve of the stopcock: a long one running the whole length of the valve and a shorter one joining it at the center, at an angle of 45°. It also shows that the housing of the valve has a small opening (*F*) on the side. When the handle of the stopcock is in position No. 1, the flow of gas is directed through the long channel into the cannula; in No. 2, the gas escapes through the opening (*F*); and in No. 3, the flow of gas is shut off.

My technic for insufflating the tubes is as follows: The cannula is attached to the rubber tubing connected with the outlet of the flow-volumeter of the Rubin apparatus. The rubber tip is moved to the desired distance from the end and secured in this position by the stop. The flow of gas is started and to regulate the rate of flow the stopcock is turned to No. 3. When the rate of flow has been regulated, the stopcock is turned to No. 2, and the cannula is introduced into the uterus.

The stopcock is then turned to No. 1, in which position the gas flows into the uterus. To interrupt the flow of gas, at any time, the stopcock is turned back to No. 3.

To summarize the advantages of this cannula:

1. By replacing the valve in the outlet tubing with this simple stopcock arrangement, we do away with two rubber tube connections and lessen the possibility of leakage.

2. As the stopcock can be regulated by the index finger of the hand holding the cannula, the operator does not have to take his eyes from the field of operation.

3. The rate of flow is easily determined by the aid of the stopcock.

4. The handle, being bent, allows a clear view through the speculum, as the hand holding the instrument does not obstruct the view, which is the case in a straight handle cannula.

5. The adjustable stop prevents the rubber tip from slipping so that the cannula cannot go into the uterine cavity farther than intended.

6. The use of this cannula makes the technic so simple that the test can be made by one person without an assistant.

327 East Eighteenth Street.

Department of Maternal Welfare

PROVISIONS FOR MATERNITY CARE IN THE UNITED STATES*

By Carolyn Conant Van Blarcom, R.N., New York, N. Y.

A DISCUSSION of provisions for maternity care in the United States seems to divide itself, logically, under the following headings:

First.—Our status in terms of our maternal mortality.

Second.—The possible bearing upon this mortality of the numerous and varied nationalities in this country and the distribution of population.

Third.—The means, (outside of private practice) through which the medical profession gives or directs maternity care, these being chiefly: (a) Hospitals, (b) Organizations other than hospitals such as the government appropriation, maternity centers, prenatal clinics, health centers, etc., (c) Public health nurses, and (d) Midwives.

Fourth.—The general results of the above work, the trend and further needs.

MATERNAL MORTALITY

In the matter of maternal mortality, the United States makes a poor showing. Childbirth still stands next to tuberculosis as a cause of death among women fifteen to forty-four years of age. Among twenty-two countries giving information, only two, Belgium and Chili, have a higher maternal death rate than we. Our maternal deaths have actually tended to increase, rather than decrease, during the past quarter of a century. In the death registration area, in 1900, the rate per 100,000 population was 13.4; in 1922, 15.6. Somewhat more reliable figures than these, though covering a shorter period, are the following rates per 1,000 live births in the birth registration area from the date of its establishment, in 1915 to 1923:

Deaths per 1,000 live births in the birth registration area, 1915 to 1923.

	1915	1916	1917	1918	1919	1920	1921	1922	1923
All puerperal causes	6.1	6.2	6.6	9.2	7.4	8.0	6.8	6.6	6.7
Puerperal septicemia	2.4	2.5	2.7	2.5	2.5	2.7	2.7	2.4	2.5
All other puerperal causes	3.7	3.7	3.9	6.6	4.9	5.3	4.1	4.2	4.1

In 1921, when the rate was 6.8, there was a total of 18,280 maternal deaths or one mother lost for every 147 babies born. A very large proportion of all these deaths have been from preventable causes. This in spite of the fact that in no country is there to be found better obstetric work, better teaching of medical students and nurses or better results among patients under good care. Evidently an explanation of this paradox would get at the root of our problem.

*Based upon a paper read before the "Third English Speaking Conference on Infant Welfare," Caxton Hall, London, England, July 3, 1924, and read at a meeting of the Section of Obstetrics and Gynecology, New York Academy of Medicine, January 27, 1925.

NATIONALITIES AND DISTRIBUTION OF POPULATION

As to nationalities, practically every nation on the face of the globe is represented among the 110,000,000 inhabitants of the United States, the size of some of the larger groups being estimated as follows:

Negroes	10,463,131 (9.9%),	or practically 10% of the entire population.
German and Austrian	10,389,790 (9.9%),	" " 10% " " " "
Irish	4,136,395 (3.9%),	" " 4% " " " "
Russian	3,871,109 (3.7%),	" " 4% " " " "
Italian	3,336,941 (3.2%),	" " 3% " " " "

In round numbers, 30 per cent of the population of the United States is of foreign stock, which means that they are either foreign born themselves or of foreign born parentage. Add to this the 10 per cent of native born negroes and we have only about 60 per cent of the population composed of native white stock. There is a fallacious impression widely current, that New York is an American city. The fact is that it is a veritable Europe, Asia, and Africa all rolled in one. Eighty per cent of the city's population is foreign stock, being composed of something more than fifty nationalities. For example:

German and Austrian	18.1%
Russian	17.5%
Italian	14.3%
Irish	11%

Many of the foreign groups establish communities patterned after their native towns, with churches, shops, theatres, and clubs preserving the customs, even dietaries of the fatherland. The result is that within the limits of one city one finds an almost endless variety of living conditions.

Advice upon matters of health and hygiene offered to people of such different habits and ideas is not likely to be acted upon uniformly. Accordingly, health education spreads slowly among the people who have migrated to America in body, but who, in spirit, abide by inherited traditions. On the other hand in such a city as London, where 95 per cent of the population is British, health teaching is given to people with so nearly the same inherited traditions that it may be expected to produce somewhat uniform response.

The differences in national background among our people seem to have a bearing upon our national maternal death rate. Among native born white women the death rate is 6.4 per 1,000 as compared with 10.8 per 1,000 among negroes. For mothers born in Ireland the rate is 9.1; Great Britain, 8.1; Canada, 7.9; Hungary, 7.1.

It is not entirely clear why there should be so much higher mortality among transplanted white women than the native born whites, but among negroes the risks of child bearing are increased by the prevalence of venereal diseases and rachitic pelves along with their poverty, ignorance, and generally poor condition.

But this diversity of peoples is not all. Apparently the distribution of the inhabitants also has a bearing upon our maternal mortality. Virtually all of the large and many of the small cities are well supplied with efficiently conducted medical and relief agencies to promote the well-being of their inhabitants. Contrasted with these well equipped if crowded cities are great areas of sparsely settled plains, prairies, deserts, and mountain country where the nearest doctor is perhaps 100 miles away. In such a state as Texas, for example, covering nearly 266,000 square miles (more than twice as large territorially as England, Ireland, Scotland, and Wales)—there is one county of over 900 square miles with only 67 inhabitants, but the physical needs of these remote people are the same as among city dwellers.

In a backwater of civilization in the Southern mountains, there are 5,000,000 primitive people who live today under practically the same conditions that surrounded their colonial ancestors two or three hundred years ago. Very often their only mode of travel is by horseback over a narrow trail, or up the bed of a mountain stream. As medical protection of any kind is practically unknown in many of these districts, the women fare badly in childbirth. Their attendants may be untrained neighbors, friends, grandmothers, husbands, workmen, or perhaps there may be no one at all present.

Curiously enough, the only obtainable figures suggest that women in rural communities have a brighter prospect of living through childbirth than urban dwellers, the rates being 7.7 per 1,000 live births for cities and 5.9 for rural districts. The probabilities are however, that the apparently high rates in cities are largely due to more accurate certification of death in municipalities, and the fact that because of education and automobiles, complicated cases are frequently removed from outlying districts to hospitals in the cities. But notwithstanding these figures, the real evidence is that city mothers, in general, have better obstetric care than rural mothers and that isolation and inaccessibility constitute something of a menace to life and health of maternity patients.

FACILITIES FOR CARE

Maternity Hospitals.—Maternity hospitals perform the twofold service of offering facilities for the care of patients and the teaching of student doctors and nurses. So far as I am able to discover, a satisfactory scheme of work and teaching is carried out or attempted in most of the modern maternity hospitals and wards. Although it may be adjusted to the needs, size and facilities of different hospitals, the essentials are much the same the country over.

There is a growing tendency among women in cities to go to hospitals for delivery. In 36 of the largest cities from which information was obtained, a total of 56 per cent of the births occurred in hospitals. In San Francisco the proportion was 85 per cent; Minneapolis 62 per cent; Washington 56 per cent; Fort Wayne 52 per cent. A comparison of the extent of hospitalization in cities and rural communities is found in Maryland. In Baltimore, the one large city, 18 per cent of the births were in hospitals and only 4 per cent in the rest of the state.

Maternity Organizations.—It is common knowledge that for at least a quarter of a century the patients of high grade obstetricians have been given efficient care and have profited by it; but until fairly recently even the best obstetricians began their care late in pregnancy and high grade facilities were so limited that good care was accessible to only a small proportion of women; too small by far to affect the maternal mortality for the country as a whole. However, with increasing recognition of the value of complete prenatal care, started early, provisions for giving this care, under reliable auspices, have been devised. It is not possible to ascertain the number of hospital beds, throughout the country, available for maternity patients today, but we do know that the number of maternity hospitals, wards and dispensaries has increased steadily during recent years; and organizations, other than hospitals, have been established to provide or secure competent supervision and care from the beginning of pregnancy throughout the puerperium.

In order to standardize maternity service for the country at large the Washington and Regional Conferences on Child Welfare adopted, in 1919, certain minimum standards for public protection of the health of mothers. Maternity centers which follow all or part of the suggestions for prenatal care contained in these recommendations have increased steadily in number and scope the country

over. In some instances the organization is devoted solely to maternity service and in others maternity service forms a part of a general health program. An interesting development of organized prenatal work is under way at the *Brooklyn Maternity Center Association.* In addition to conducting free clinics, the Association provides prenatal care and instruction for women in moderate circumstances through its *Mothercraft Club* in which a small fee is charged for membership, and in cooperation with the Brooklyn Institute of Arts and Sciences, it has inaugurated a course of lectures on maternity and child care.

Maternity and Infancy Act.—An important factor in providing adequate maternity care throughout the entire country is a fund appropriated under the Sheppard-Towner Act of 1921, entitled *An Act for the Promotion of the Welfare and Hygiene of Maternity and Infancy.* This law was enacted as a result of the efforts and country-wide educational work of the Federal Children's Bureau strongly supported by individuals and groups of doctors, club women, social workers and the press. In all parts of the country the fund has given an impulse to official effort to provide or make available for all expectant mothers not in the care of private physicians, prenatal care, safe delivery and protection during the puerperium. On June 30, 1923, forty-one states were operating under the act, through official state bureaus. Although each state conducts its work to meet its own needs the general method employed by all is to stimulate local interest and initiative through education as to the value and feasibility of good maternity care, and to give temporary aid in establishing work to be maintained ultimately by local funds. Special effort is made to extend to rural communities the kind of service and facilities that have proved effective in urban districts.

Concerning the work itself we find that although there are health conferences or centers for infants and preschool children in 36 states, there are *maternity conference centers* in only 31. Evidently the importance of maternity care is not as widely appreciated as the value of child care.

The proportion of expectant mothers attending prenatal clinics in 22 cities giving figures for 1923 varied as follows: In only one city less than 1 per cent of the maternity patients had prenatal care: in five, from one to five per 100: in four cities, from five to ten per 100: in seven, from ten to fifteen; and in five cities more than 15 out of every 100 expectant mothers were under supervision. (Utica 15.5 per cent; Providence 15.6 per cent; Minneapolis 18 per cent; San Diego 26.1 per cent; New Haven 27 per cent.)

Official provision for safe delivery has not kept pace with prenatal work. It seems to follow in the wake of educational work along prenatal lines and at present is found in comparatively few states. In some states effort is made to help the doctors who deplore the difficulty of performing clean deliveries in isolated homes. The Divisions of Child Hygiene have prepared model obstetric packages containing the minimum supplies for a normal delivery at home. The supplies are made from materials obtainable at practically any retail store and may be prepared by any woman of average intelligence.

Official provision for adequate postnatal care is negligible. A few states are encouraging the establishment of bureaus through which domestic helpers may be obtained for a moderate wage by young mothers who are confined at home. This affords relief from anxiety and responsibility about meals and housework, thus insuring rest during the puerperium which would otherwise be impossible for many women.

Public Health Nurses.—In many cities, towns and rural communities where there are no maternity clinics, public health nurses manage to give prenatal supervision through one means or another,—always, of course, under medical direction. The National Organization for Public Health Nursing (1923) reports 206 volunteer

agencies, each employing more than three nurses, a total of 2704 nurses, giving prenatal service in 196 communities in 41 states. Some 2,000 volunteer agencies, each employing three or fewer nurses, either definitely offer prenatal nursing or will respond to requests from doctors for such service. The Organization states that prenatal nursing service is extending so rapidly, particularly in rural communities, that the newest figures available are always far behind the real situation.

Midwives.—Whether we are looking forward or backwards upon this question of provision for maternity care we cannot, with intelligence, ignore our so-called midwife problem—a situation, by the way, that is incomprehensible to Europeans. In all civilized countries, except the United States, the midwife is frankly acknowledged to be a factor inevitably operating for or against the welfare of mothers and babies. In their interests she is trained, licensed and restricted.

It is practically impossible to obtain exact information about the extent of midwives' work in America, but there are not far from 50,000 women, loosely described as midwives, attending perhaps 20 per cent of the births throughout the country. In certain New England states they are almost unknown, as in Vermont, where there are only seven all told. But in some sections, particularly the South, the magnitude of the problem alone constitutes a menace. This is indicated by the following figures upon the proportion of births attended by midwives, and the estimated number of women practicing.

In St. Louis	midwives	report	44	per cent	of	all	births.
New Orleans	"	"	80	per cent	"	"	"
New Mexico	"	"	40	per cent	"	"	"
In Mississippi	4,000	midwives	attend	48	per cent	of	all births.
Alabama	1,500	"	"	60	per cent	"	"
Virginia	6,000	"	"	40	per cent	"	"
Georgia	5,000	"	"	20	per cent	"	"
Kentucky	2,500	"	"	20	per cent	"	"
Maryland	2,000	"	"	66	per cent	"	"
North Carolina	6,500	"	"	73.5	per cent of the negro births.		
South Carolina	5,000	"	"	80	per cent of negro and 20% of white births.		

Midwife Training.—So far as one can learn, there is in the entire country but one veritable school for midwife training, connected with a hospital of undoubted standing, in which the pupils are resident, namely, the Bellevue School for Midwives. It was established in 1911 through the combined efforts of the hospital trustees and the New York Committee for Prevention of Blindness. This school is for untrained women, not nurses, and has graduated about 450 midwives. In Philadelphia, the Maternity Hospital and the Preston Retreat will accept applicants for midwife training, but both schools have graduated only about a dozen pupils all told. Some state and local departments of health greatly improve the work of midwives practicing within their bailiwicks by means of supervision, lectures, and demonstrations by doctors and nurses under official auspices; but except for the graduates from Bellevue and two Philadelphia schools, most of the midwives in the United States who approach competency were trained in European schools before coming to America. The excellent work done by many of the trained midwives makes us realize how terribly defrauded are the patients who are attended by unqualified women, particularly in rural communities.

For many years there have been nurses engaged in rural work, (who inevitably perform deliveries among uncared for rural mothers) who have wanted to take midwife training, but there has been no school with a definitely organized course in connection with a maternity hospital, where such nurses could go for this training. As a result of this inconsistent situation, three American nurses have gone to London during the past year and entered schools for midwives.

Midwife Control.—So far as official control is concerned, there is no effort in 9 of our 48 states to examine, register or control midwives, much less train them. Any woman who wishes, therefore, may practice unmolested in Maine, Michigan, Nebraska, South Dakota, Texas, Vermont, West Virginia, Wyoming, and Massachusetts. Although the midwife does not legally exist in Massachusetts the registrars of vital statistics are so aware of her presence in the flesh that they pay her twenty-five cents for each birth certificate she files. These officials, in 22 Massachusetts towns and cities give the names of 137 midwives who were paid from state funds for reporting 2,723 births in 1922.

In 17 states there are no state-wide requirements but midwives are supposed to register with a local authority. In 22 states there are irregular requirements for state permission or licensure to practice but in only four of these, New York, New Jersey, Pennsylvania and Connecticut is there anything like satisfactory control of the practice.

The last word in safeguarding mothers and babies will not be said until, in every state, there is adequate provision for training and controlling those who attend these patients, no matter by what name they are called, nor until it is made impossible for untrained people to practice midwifery "habitually and for gain."

GENERAL RESULTS AND FURTHER NEEDS

We have considered the details of provisions for excellent care of maternity patients in hospitals; taken a look at the aims and results of prenatal clinic work as well as government provisions for safeguarding the lives of mothers and babies; paid respectful attention to figures telling how many nurses and midwives are doing what in how many states, and mulled over some dry as dust data about what happens to whole and fractional mothers in lots of a thousand.

We preceive that maternity hospital facilities are increasing and the standards of work are improving; doctors and nurses are being trained in increasing numbers; a start is being made to give midwife training to graduate nurses while maternity specialists are becoming available to more and more of the remote and isolated communities. The general public believes more widely in the urgency and feasibility of good maternity care and is seeking such care with growing frequency. Should we stop just there we could all settle back with smiles of satisfaction and complacency.

But the truth is, as you and I well know, that this presentation of facts and figures, from a practical standpoint, is not worth the paper it is written on nor the time it has taken to read it. In years past, many papers—abler than mine, more scientific, possibly longer—have been written, presented and published; and the net result of it all is that there has been no appreciable reduction in our national maternal death rate in twenty-five years.

What is wrong?—We know, without help from tables of percentages that the obstetricians in this country can and do give life-saving care to maternity patients, and we also know that year after year an army of women in the prime of life are struck down and killed—or what is often worse are made lifelong invalids because they do not receive this care.

What is wrong?—The answer is so apparent it seems scarcely worth while to voice it.

Complete and skilful maternity care is not widely enough available in this country and the lay public is not as yet widely enough convinced of its urgency. We still have too few good doctors and too many poor ones practicing obstetrics. Too few well trained maternity nurses and midwives. Too few hospitals and other agencies provide complete maternity care to patients, and facilities for training to doctors, nurses and midwives.

The remedy is education. The attitude back of this education, in my judgment, is the heart of the whole situation.

Every detail of maternity work that is done, east, west, north and south must originate in and be guided by the medical profession. From managing the ponderous machinery of government organization down to bathing the eyes of a baby in a remote mountain cabin, the entire scheme is the application of medical teaching—application to the individual mothers and babies of the practices that the medical profession has demonstrated, will safeguard the lives and health of these patients.

What we need is not that the high peaks of obstetric work in this country shall be higher, making it possible to save a few mothers from rare complications, but that the average of the care given to all patients shall be raised. That every expectant mother shall be taken seriously. That every detail of the care and supervision of even normal cases shall be regarded as of such importance that it will be performed earnestly and conscientiously. That those in high places give high value to obstetric practice is not enough. The whole question needs to be exalted in the minds of the many to the plane it now occupies in the minds of comparatively few. By precept and example, every student and every nurse should to be so impressed by the dignity and enormous importance of all obstetric work that their attitude will be communicated to others, patients included.

Wherever really good work has been done, in the cities or country, we find that those who are doing it have not only knowledge and skill but a spark of something else—call it devotion, reverence, what you will—but something that characterizes the work with dignity and respect. When one considers the scope of obstetric practice—how necessary are skill, resourcefulness, insight, and sympathy—it may well challenge the most and the best that one has to give.

Education then. Education that fires and drives and inspires, from the medical profession down through its various assistants and the laity.

Education that will so impress every human being with the urgency and feasibility of good maternity care, that will be demanded and given in every case. Education in its broadest, completest sense will inevitably go far toward reducing our utterly wicked, needless loss of mothers and babies.

Publications from the following sources of information have been consulted: the Federal Children's Bureau, United States Public Health Service, United States Census Bureau, American Public Health Association, American Child Health Association, National Organization for Public Health Nursing, Statistical Department, Metropolitan Life Insurance Company, Pennsylvania Bureau of Medical Education and Licensure, Henry Street Nurses' Settlement.

149 EAST FORTIETH STREET.

(*For discussion, see p.* 723.)

WHAT NEW YORK STATE IS DOING TO REDUCE MATERNAL MORTALITY*

By Florence McKay, M.D., Albany, N. Y.

(Chief of the Division of Maternal Welfare, State Department of Health.)

THE maternal death rate in New York State outside of New York City, like that of other states in the Union, is high. For the five year period, 1916 to 1920, the up-state rate from all puerperal causes was 66 for 10,000 births including stillbirths; 69 for cities and for rural areas 58. For New York City it was 46. At that time the distribution of rates throughout the state was computed for as by the Division of Vital Statistics. This was published in a bulletin,—*The Geographical Distribution of Maternal Mortality and Stillbirths in New York State.* The rates for single years since 1920 indicate that there is some decrease throughout the state. The 1923 rate was 60 and the provisional 1924 rate was 54. What the relation of the work of the State Department of Health bears to the reduction of mortality rates is a question which cannot be definitely answered. Other organized and individual efforts in many instances deserve due credit.

In analyzing the causes of puerperal deaths in the state, we find that puerperal septicemia alone causes more than 30 per cent of the deaths; puerperal albuminuria and convulsions cause 26 to 27 per cent and the remaining percentage includes all other causes. Whether the other causes are subject to reduction is not a question for discussion at this time but certainly we are all agreed that puerperal septicemia and eclampsia *are* capable of reduction.

In the endeavors of the Division of Maternity, Infancy and Child Hygiene toward the reduction of these rates in New York State it is our purpose to stimulate local responsibility and to assist local effort in improving maternity care during pregnancy, confinement and the puerperium. We try to furnish public health education in maternity care to mothers, midwives and nurses and to increase the interest of physicians in the public health aspects of maternity care. We also make such surveys, studies and demonstrations as may broaden our present field of knowledge and tend to increased effort and improved methods. Some of the methods which we are using in striving toward these goals are hereinafter briefly described.

MOTHERS' HEALTH CLUBS

In order to teach mothers how to take care of themselves and how to prepare for confinement and to care for their babies, we foster the organization of women in groups termed "Mothers' Health Clubs." These are taught by public health nurses, the basis of instruction in maternity care being that outlined in the *Routines of the Maternity Center Association.* During the past year, thirty-five groups of women have been formed for instruction in maternity care. Some have been taught by both local nurses and others by nurses from the State Department of Health. For instance, during January and February of this year nurses from our own division are teaching from one to two groups in seven counties in the state giving one lesson each week to each 45 groups. By this means we

*Read at a meeting of the Section of Obstetrics and Gynecology, New York Academy of Medicine, January 27, 1925.

hope not only to teach the mother the care of herself, but to bring about a quicker contact between the mother and her physician in order that she may have continuous medical supervision throughout pregnancy. We welcome to the groups not prospective mothers alone but any women who may be interested in this subject, knowing well that any mother may need this information at any time; that each member of the group is a source of dissemination of a certain amount of information among the uninformed in her neighborhood and even that it is a good thing to have grandmothers well informed on this subject.

COUNTY FAIRS

Rural mothers are particularly difficult to reach, but most of them attend the county fair. In addition to the rural Mothers' Health Clubs, many of which are organized among the agricultural groups, we have for the past two years conducted a maternity and infancy exhibit at most of the county fairs in the state, in charge of a maternity and infancy nurse. Every opportunity is given for individual conferences of mothers with the nurse and in this way we have reached more than 13,000 mothers, giving 3841 mothers individual instruction, with a total of 15,144 people reached in groups. These county fair exhibits have been the starting point of a number of Mothers' Health Clubs and of local interest by physicians and nurses in maternity problems.

MATERNITY HYGIENE CLASSES

In order to have standardized teaching of Mothers' Health Clubs it was found necessary to give additional instruction to many of the public health nurses who had had no experience in teaching maternity hygiene. We have, therefore, conducted maternity hygiene classes for nurses in 37 communities in New York State reaching 713 nurses, 275 of whom have completed the course and matriculated and are now able to teach Mothers' Health Clubs in their own localities.

PRENATAL CONSULTATIONS

In communities outside of New York City prenatal consultations are a new development even in connection with hospitals. Those conducted in child hygiene stations are even more of a novelty. Previous to the organization of our prenatal consultation unit there were practically none of the latter in New York State outside of New York City. It was with some trepidation that we introduced this phase of our work but it is proving to be one of the most successful of our activities. Our prenatal consultation unit comprises a full-time experienced obstetrician and two full-time public health nurses who travel from place to place throughout the state conducting prenatal consultations once a month. This is done in response to request from the local health officer and the work is conducted only in communities where public health nursing is already established as it is necessary to depend upon the local public health nurse for intermediate follow up of the cases. One nurse does the advance work for the first consultation, at the same time demonstrating methods to the local nurses. The other nurse travels with the obstetrician assisting in the conduct of the consultations. Two hundred seventy-two consultations have been held in 30 communities with a total attendance of 1482. So great has been the demand for this type of work that on December 1, it was necessary for us to add an additional obstetrician to our staff. The patients reached in the prenatal consultations are primarily those of midwives or those who have made no provision for maternity care. We are willing, however, to take patients of physicians if they request in writing that they desire this service and there is a slow but steady increase of such requests

from physicians. Our prenatal consultations are conducted only until the locality is ready and willing to take over the work for itself. Our unit then withdraws and the work is then conducted by local physicians and nurses.

FINANCIAL AID

Through the Federal funds made available by the Sheppard-Towner Maternity and Infancy Act we are able to assist financially in the employment of local physicians and nurses conducting maternity and infancy work. We have offered to pay into the local public treasury about half the salary of a local nurse in certain communities providing the community contributes at least an equal amount from public funds and there are now twenty-five nurses operating on this plan. We require that the nurse spend at least one-half of her time or its equivalent on maternity and infancy activities which are supervised by the Division. This type of nursing aid has been given chiefly in cities. In order to extend a nursing service to rural communities where it is especially needed and where it is more difficult to raise local funds we are now about to undertake the placing of a nurse in a rural community for at least one year and allowing the local community to gradually year by year assume as much financial responsibility as they may be able to carry.

We are also able to offer to local physicians who take over prenatal consultations or do other types of maternity and infancy work an honorarium of from one hundred to two hundred dollars a year depending upon the amount of service rendered.

CONSULTANT NURSES

We have in the state four maternity and infancy nursing districts, each one in the charge of a consultant nurse who has had special training and experience in maternity and infancy work. These nurses and their assistants give help in the establishment of new maternity and infancy activities or the extension of this line of work in local communities, by going into the communities, working with the local nurse, teaching her methods where needed and helping her until her work is firmly established.

The methods of maternity work in rural communities have as yet not been standardized. To the Maternity Center Association of New York we are indebted for careful standardized urban methods, many of which are applicable to rural communities. In some phases of the work, however, the methods must of necessity vary in a rural community. We are now about to undertake a study of such methods and possible standardization of rural maternity methods by working out in one of the smaller rural counties of the state a practical rural maternity program. We have taken on our staff nurses trained at the Maternity Center Association and are fortunate in having the assistance of the Directors of that association in working out the details of this rural program. We hope that the work done here may be of assistance to all rural work in New York State and possibly to other states as well.

REGIONAL CONSULTANTS

Our work in interesting physicians is done largely through our Board of Regional Consultants in Obstetrics who in addition to this activity act as an advisory committee to our division in all phases of our work. They are available for meeting medical societies in any part of the state. At first their talks to medical societies comprised largely the explaining of the work and purposes of our division. Now they are branching out more in the line of lectures and clinics and plans are at present under way for an increase in this type of service. One

of their early activities was the formulation of a little leaflet entitled "Standards of Maternity Care" designed for the use of physicians. This has been sent to all physicians in the state. Recently standards for the work of local physicians in prenatal consultations have been devised and are about to be used, particularly in the communities to which we are giving financial aid. The assistance given by this board of consultants who serve without salary is of an inestimable value to the work of our division.

SURVEYS

In some communities where maternal and infant mortality rates have for some time been persistently high, we have been requested by the Medical Society or the local Health Officer to make a survey of the community with recommendations for the reduction of rates. This has been done in Ogdensburg, Plattsburgh, Rensselaer County and Troy, Cohoes and Amsterdam. In three of these communities there has resulted the establishment of new maternity and infancy activities; in the other two, preparations for the establishment of such work are under way.

PUERPERAL DEATH QUESTIONNAIRE

In order to obtain more information concerning the causes of puerperal deaths a questionnaire has been sent to all physicians who signed certificates of death from puerperal causes. We have had excellent cooperation from these physicians who have given of their time freely in the answering of these questionnaires. A separate special study has been made of these results.

PUERPERAL SEPSIS REPORTING

With the high puerperal septicemia death rate in mind, we have been making a special campaign during the past year for better reporting of puerperal sepsis both as to cases and deaths. Many more deaths than cases are reported. Letters have been sent to physicians all over the state and reports received carefully checked and followed up.

OBSTETRIC PACKAGE

Another effort toward the reduction of puerperal sepsis has been to promote the making and distribution of a sterile obstetric package. This package contains the towels, bed pads, leggins, gauze pads, etc., needed for home delivery. The packages are made by local women's clubs, sterilized at local hospitals and made available to local physicians and midwives, either free or at cost. The directions for the making and demonstration of methods are provided from our Division. Last spring three nurses demonstrated these packages to nearly all public health nurses, all the midwives in the state, to many women's organizations, to several physicians, and to two county medical societies. A letter has been sent to all physicians in the state explaining that they can have this service in their own community by interesting some local women's organization or the public health nurse. We have no means of knowing how general has been the use of these packages except through letters of appreciation which come to the division. We have on record 58 communities where packages have been made or are in the process of making, but we have sent out about 250 sample packages for demonstration.

MIDWIVES

The licensing and supervision of 430 midwives has for many years been a function of this division. Recently we have been endeavoring to add some instruction and to arouse in the midwives a greater feeling of responsibility for their

patients. In a few communities we have been instrumental in forming midwives' clubs which are a semi-social organization addressed at regular intervals by physicians or nurses on some phase of midwifery work. Where such clubs have not been formed, we have been able to get the midwives together in groups for such instruction. Lectures on nutrition of the expectant mother have been included in these groups and all have been well received by the midwives.

FURNISHING SUPPLIES

For nurses and physicians who are conducting prenatal work throughout the state we furnish record forms, exhibit materials, literature, prenatal bags and some other supplies as necessary. We also furnish films, slides, lecturers and literature to all types of organizations requesting them.

This report is submitted as presenting by no means a complete or perfect maternity program for New York or any other state. It merely outlines the result of what we have been able to accomplish in the organization of entirely new work over a two year period. We are earnestly hoping to produce a more complete and more perfectly organized piece of work within the next few years.

(*For discussion, see p. 723.*)

Society Transactions

AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

THIRTY-SEVENTH ANNUAL MEETING

CLEVELAND, OHIO, SEPTEMBER 18-20, 1924.

(Continued from April)

DR. JAMES K. QUIGLEY, Rochester, N. Y., read a paper entitled **Rupture of the Uterus, Including a Report of Two Cases with Recovery Following Hysterectomy.** (For original article, see page 685.)

DISCUSSION

DR. LOUIS E. PHANEUF, BOSTON, MASS.—I want to briefly report a case of ruptured uterus I operated on six months ago, in order to bring out one point which has not been mentioned.

This woman was seen in consultation in her fifth month of pregnancy. She had been bleeding ten days and placenta previa diagnosed. The bleeding had brought on a severe anemia. I saw her at about five in the afternoon. Shortly after her admission to the hospital, the bleeding gradually ceased. The next morning the bleeding started again; she was given light ether anesthesia, and her uterus and vagina were packed. It was noticed at the time that her cervix was filled with scar tissue and dilated to admit a finger. Contractions started in the afternoon of the same day, and at seven o'clock the next morning she had very severe pains. When I saw her the pains had stopped. She was taken to the operating room and given light ether anesthesia and the pack was removed. The cervix was rigid and still admitted one finger. Upon removing the pack the anterior vaginal wall was seen to bulge. A short incision was made in the vaginal wall transversely and I found that the uterus was ruptured. The patient was given 600 c.c. of citrated blood intravenously. She rallied after that, and with small doses of morphia was kept comfortable. At five in the afternoon her pulse was 120.

She was now prepared for a hysterectomy. Upon opening the abdomen the fetus and placenta were found extruded under the bladder, and that the fundus was firmly contracted behind the mass. The bladder peritoneum was incised; the products of conception, together with a large quantity of blood clot were removed, and a supravaginal hysterectomy with double salpingooophorectomy were performed, using clamps.

This patient had marked distention of the colon and ileum, not infrequently found in this type of case. A patient may stand a hysterectomy for ruptured uterus, but she is not always able to stand the added shock of active treatment for distention. To avoid this, I did a cecostomy, introducing a No. 28 French catheter in the cecum, and drained abdominally and vaginally. The result of the

enterostomy was that this patient did not have to be treated for distention and thereby kept her strength. She was given her first enema on the third day; the fecal fistula was closed on the twelfth day, and she was discharged well at the end of three weeks.

DR. H. W. HEWITT, DETROIT, MICH.—I would like to discuss this paper from the standpoint of an abdominal surgeon. It seems to me that rupture of the uterus is an abdominal emergency and should be so treated.

The question comes up as to the best manner of stopping the bleeding. There are two ways of doing that. Babcock would tell us to go in through the vagina and put clamps on the broad ligament, do nothing else, and transfuse the patient. Of course, in extreme conditions that would be satisfactory, but a quick laparotomy, tying them off, and putting in a Crile pack, quickly closing the wound as a primary operation, next transfusing the patient, and then going back later and taking out the uterus, seems to me a good procedure.

Of course, in cases that are not badly shocked it seems to me the best procedure would be to repair the uterus and transfuse the patient with blood if necessary.

If the patient does not need blood transfusion but is in poor physical condition, large quantities of fluid given by hypodermoclysis under each breast is a very satisfactory procedure, and the way in which we do it is to put a needle under each breast and leave them in, and the interne later gives a 5 per cent glucose solution. He can fill the reservoir with glucose solution and keep it warm and give an amount of glucose solution every two hours. A large amount of fluid will help, but I think the blood transfusion done once or twice or three times, or as many times as necessary, will save the patient.

DR. WILLIAM E. DARNALL, Atlantic City, N. J., presented a paper entitled **Pseudocartilaginous Cyst of the Ovary.** (For original article, see page 683.)

DISCUSSION

JAMES E. DAVIS, Detroit, Michigan.—There is just one point that is of very practical importance in this type of growth. If it is confined entirely within a cyst wall and is nonadherent to the peritoneum, it does not matter what the histologic characteristics are within the wall, but just as soon as the proliferation is such as to penetrate the wall and adhere to the peritoneum, it should be designated definitely as malignant.

DR. WALTER T. DANNREUTHER presented a paper entitled **Combined Radium Therapy and Operation in the Treatment of Cancer of the Uterus.** (For original article, see page 608.)

DR. PAUL KLEMPERER, New York, read a paper (by invitation) entitled **Histopathologic Changes in Uterine Carcinoma Treated with Radium.** (For original article, see page 619.)

DR. HENRY SCHMITZ, Chicago, Ill., presented a paper entitled **The Treatment of Inoperable Cervical Carcinomata with Measured Doses of X-rays and Radium Based on Microscopic Examinations.** (For original article, see page 644.)

DR. U. V. PORTMANN, Cleveland, Ohio, presented a paper entitled **Radiation Therapy of Carcinoma of the Uterus.** (For original article, see page 658.)

DR. THOMAS E. JONES, Cleveland, Ohio, presented a paper entitled **The Rôle of Radium in the Treatment of Cancer of the Cervix.** (For original article, see page 662.)

DR. GEO. W. CRILE, Cleveland, Ohio, read a paper entitled **Suggested Biophysical Interpretation of Cancer.** (For original article, see page 642.)

DISCUSSION ON THE PAPERS OF DRS. DANNREUTHER, KLEMPERER, SCHMITZ, PORTMANN, JONES AND CRILE

DR. E. A. WEISS, Pittsburgh, Pa.—Some of the statistics quoted this morning show clearly that the operative results for cancer of the cervix are far from satisfactory and often disappointing. I was formerly very enthusiastic about the radical operation. In recent years we have adopted the combined treatment and our results were far better than with the radical operation. But even with this method the end-results, that is the five year and the eight year results, were not satisfactory; even though the immediate mortality was not high and the morbidity was not great.

When we compare such results with those obtained with x-ray and radium, we must admit that in spite of our enthusiasm for operation, we are justified in giving up the more radical procedures for these more conservative measures. During the past year, only three times did we attempt the so-called radical operation, and I believe I am safe in saying that in the coming year there will be no radical operations and all cases of cancer will be treated by radiation according to the methods outlined.

DR. T. E. JONES.—With regard to the intoxication that goes on after radiation, I would like to quote, for instance, cases of splenomyelogenous leucemia which must be looked upon as a malignant disease. Patients come in with the abdomen practically filled with spleen, and I have given them as high as 15,000 hours radium in periods of thirty-six hours without observing the slightest bad effect, no nausea, and no vomiting. If cellular destruction accounts for toxic symptoms, it appears to me that these patients should be very ill.

DR. W. S. BAINBRIDGE, New York City.—I wish to emphasize the necessity for the recognition by the surgeon, not only of the existence of *cancer* in the patient, but also the necessity of being able to estimate the *degree* of the malig-

nancy present. Our records show many cases sent to us as irremovable and inoperable cancer which have proved to be neither inoperable nor irremovable. Dr. Crile's recent effort to develop new methods of diagnoses may prove a real boon in the cancer field, particularly in these clinically doubtful cases.

Operability and inoperability are terms frequently misconstrued. I attempt to classify my cases as those which are *directly operable* and *indirectly operable,* and those which are *inoperable, directly* and *indirectly.* Many cases are termed "inoperable" simply because of faulty diagnoses. Not that the cases so diagnosed are free from cancer, but because there are present other pathologic conditions which mask the true limits of the malignant disease. In many cases the patient is dying, not so much from the cancer, as from absorption of toxic products. While it may be true that some of these toxins emanate from the neoplasm, it is equally true that more often the patient's apparently hopeless condition is due to faulty elimination, pus, etc., and that with the correction of these, the patient's physical status may be improved to an unbelievable degree.

The cases which are directly inoperable, but indirectly operable, are the ones which I wish to emphasize here. For twenty years, or more, we have been experimenting with one agent after another in the treatment of these cases. First, we tried heat; then chemical applications; next, radium or x-ray, or radium and x-ray combined, and, finally, the pendulum has swung back again to surgery, either alone or combined with one of these other agents.

For the last fifteen years, it has been my plan, in frankly irremovable cases, irremovable from the standpoint of any hope of cure, to treat the patient very much as we treat a fire aboard a ship at sea. We know the fire cannot be put out, but we realize that it can be kept from spreading from one compartment to another by closing the hatches and preventing any oxygen from reaching the blaze. The situation is primarily the same in irremovable cancer, in many cases.

In irremovable pelvic cancer, if there are no contraindications, I perform a laparotomy, then ligate the ovarian arteries; perform double oophorectomy; ligate the internal iliacs and, when large, the sacra media. After this ligation, the glands along the iliacs are removed en masse, from the receptaculum chyli to the obturator foramen. The glands situated within and around the obturator foramen are removed and all pathologic conditions corrected as far as possible. In accordance with the Beatson theory of the presumptive influence of the ovarian irritation upon the cancer process, removal of the ovaries and parovarian tissue is indicated. After completing the above operative procedure, all has been done for the patient with uterine carcinoma, which in the present state of knowledge of cancer therapy, is possible. By arterial ligation and lymphatic block, in many cases of pelvic cancer, the growth has been checked for a considerable period of time, the patient has been made infinitely more comfortable and in the end has died from causes not directly associated with the cancer.

DR. GEO. VAN AMBER BROWN, Detroit, Michigan.—We are all pretty well agreed that x-ray and radium, or heat will destroy the cancer cell. The great trouble is to get at the cancer cell in remote areas, and on account of the very discouraging results from x-ray and radium, or a combination of the two, five years ago I began the use of the starvation ligature as has just been described by Dr. Bainbridge, adding to the starvation treatment the use of heat, and I want briefly now to tell you the results of my experience.

From twenty consecutive cases operated on in this way, there was no immediate mortality. Since operation, one of those patients has been lost track of; five have died, and there are fourteen living. Out of fourteen that are living, eight are subjectively and objectively well, which means that up to the present

we have an apparent cure of 40 per cent. The time average for those eight now is about two years and nine months. The longest time that has elapsed in any of these cases is four years and one month, and that in a case I have cited previously of a young woman twenty-seven years of age with so-called incurable inoperable cancer, which could only be dealt with by indirect approach. The woman refused to have her ovaries removed. I held a consultation and was advised not to operate on the woman, as the case was hopeless. A specimen was taken for microscopic study, sections were made and reported carcinoma. That young woman is today perfectly well. She has gained 30 pounds in weight, menstruates three days out of each month just as she did in her earlier days before carcinoma started. I think this is a result you never could hope to obtain by either x-ray or radium, because with the use of either we certainly would have sterilized the patient, producing amenorrhea, while following the heat and starvation ligature treatment this woman is not sterile.

DR. ARTHUR STEIN, New York, N. Y., presented a paper entitled **Gangrene of the Extremities Following Gynecologic Operations and the Puerperium.** (For original article, see page 595.)

DISCUSSION

DR. W. W. BABCOCK, Philadelphia, Pa.—I remember a case which was very much like the one Dr. Stein has described; the clot recurred as Dr. Stewart sutured the artery; he reopened and removed the clot and again it recurred. Finally, he gave it up in despair. The endothelial lining of the artery where a thrombus forms is so changed that when the blood touches the spot it at once begins to clot. With this endothelial change present, the condition seems rather hopeless.

If you operate on arteries, I can commend as a simple clamp, a bit of soft tape, preferably of silk, held snugly about the vessel by a suitable hemostat. The tape will occlude a large artery with but little pressure and little traumatism.

A word about thrombosis in veins. If these are septic, or even if they are not septic, be very careful and do not displace or remove them. In the very few instances in which I have seen septic thrombi of varicose veins of the leg treated by ligation or phlebectomy fatal dissemination of clot or bacteria has occurred. Gently incise and drain a suppurating vein, but do not ligate, curette, irrigate or excise it.

The death of a medical friend of mine brings up the warning also to avoid massage near a thrombus. An operation had been done for cancer of the sigmoid and following this an acute thrombosis in the veins of the leg occurred. For the violent pain that came with the thrombosis, the leg was gently massaged. Within about fifteen minutes the doctor was dead from pulmonary embolism. You rarely see this catastrophe if you protect the so-called "milk legs" that occur after pregnancy or other cause. Wrap them up and keep hands off and elevate them, and treat them in a careful, conservative way.

DR. HENRY SCHMITZ, Chicago, Ill.—In regard to thrombosis, the question arises whether we can do anything to prevent it. Usually we will find in these large abdominal tumors, and sometimes even in the small ones, an enormous dilation of the pelvic blood vessels. It has been our practice in our clinic to gently compress the blood out of the blood vessels towards the uterus and then clamp the vessels. It is surprising to see the rapid contraction of the blood vessels.

The second question is whether it is always indicated, or whether it is good surgery to remove the normal appendix when operating on such severe pelvic pathology. We are coming more and more to the conviction that in operations for these large tumors, or other severe pathology, it is good surgery to leave the normal appendix.

Finally, a little point in technic might be mentioned which is very important and might improve results in treatment. Make an incision over the involved artery low down in the leg and then irrigate the entire length of the blood vessel from below upward. In this way we are able to remove almost all embolic material. Of course, if the embolus is situated high up in the pelvis or beyond the inguinal ligament, we cannot remove the obstruction in this manner.

DR. W. S. BAINBRIDGE, New York.—Perhaps two added cases might prove of interest in connection with this important paper. One occurred at the Presbyterian Hospital, New York City. It was cancer of the right groin, which proved to be irremovable, and involved both the femoral artery and vein. The hemorrhage could not be controlled until the external iliac vein and artery had been ligated just above Poupart's ligament. Gangrene of the leg developed very promptly and amputation was necessary. The patient lived for some weeks and later died of pneumonia.

The second case was one in which we attempted to do the starvation ligature operation in a uterine cancer. We tried to tie off the internal iliac on the right side but the artery was so badly diseased, not from the cancer, but from arteritis, that it gave way and I was compelled to tie the common iliac just above its bifurcation, in two places, a half-inch apart. Ligation of the left iliac was done, and the patient lived nearly a year and was able to get about and enjoy life. There was no marked circulatory disturbance. There was a slight numbness of the limbs for a time, but compensatory circulation took place. Later, the patient died of the irremovable uterine cancer.

I may say in passing, that in over 200 cases in which I have ligated both internal iliacs, both ovarian arteries and, in some cases, the sacra media, as well, I have seen no cases of gangrene nor have I seen sloughing of the bladder wall or contiguous structures. Occasionally, I have seen a marked shrinking and distinct pallor of the cancer mass, following the arterial ligation.

DR. STEIN (closing).—I fully agree with Dr. Babcock that cases of thrombosis of the veins should be left alone. I only wanted to bring out the importance of an early diagnosis of the occurrence of an embolism in the large arteries, and the performance of an early arteriotomy.

I fully agree with Dr. Schmitz, that in some cases it might be necessary to make not only one incision into the artery, but two, so that one might be able to thoroughly wash out the artery with a catheter.

There is another point in the technic, namely; as we all know through Lewisohn's excellent investigation in his blood transfusion, that sodium citrate prohibits the coagulation of blood, I would suggest that anybody who attempts an embolectomy use a sodium citrate solution, instead of ligatures soaked in oil.

DR. A. H. BILL, Cleveland, Ohio, read a paper entitled **A New Axis Traction Handle for Solid Blade Forceps.** (For original article, see page 606.)

NEW YORK OBSTETRICAL SOCIETY

MEETING OF JANUARY 13, 1925

THE PRESIDENT, DR. REGINALD M. RAWLS, IN THE CHAIR

DR. ISIDOR KROSS presented a paper entitled **Ovarian Transplantation.** (For original article, see page 628.)

DISCUSSION

DR. FREDERIC C. HOLDEN.—I would like to ask where one may procure healthy immature ovaries.

DR. KROSS.—In any maternity hospital there are always a number of stillbirths that occur in patients who have no positive Wassermann reaction. Carrel has shown that you can take a young ovary, or any tissue, and keep it in a refrigerator, unchanged quite a while. So given the patient, you can get the material very readily.

DR. FREDERIC C. HOLDEN.—Has that been done?

DR. KROSS.—No, it has not been done to my knowledge. The only thing is this: there has recently been published a German work in the *Zentralblatt für Gynaekologie* (Zondek and Wolff, 1924, No. 48, p. 2195), where ovaries were used that were kept in a refrigerator. Zondek and Wolff did not use immature ovaries, but apparently got fairly good results. They have not kept their cases on record for a long time because the work has just been recently done.

DR. ROBERT L. DICKINSON presented a paper entitled **Animal Studies of Fertility and Sterility Bearing on Human Problems.** (This article with its discussion will appear in a subsequent issue.)

NEW YORK OBSTETRICAL SOCIETY

MEETING OF FEBRUARY 10, 1925

THE PRESIDENT, DR. R. M. RAWLS, IN THE CHAIR

DR. HERBERT THOMS presented a report on **X-Ray Pelvimetry.** (For original article, see page 667.)

DISCUSSION

DR. THOMS.—In reply to Dr. Mabbott's question, I would say that the centimeter-square-grid is made for each patient. I expect later however, to make a rule or gauge which will probably obviate this extra exposure.

I do not see why the cost should be in any way prohibitive. The whole procedure only takes about ten minutes. Of course the obstetrician should work

with the roentgenologist. The obstetrician can more accurately palpate the fetal head and determine the plane of the biparietal diameter.

Such a method is not intended to be a routine procedure. However, in certain cases it becomes a great comfort and satisfaction. In cases of slight or moderate disproportion at term and in cases which present themselves early in pregnancy where all the external measurements are below normal, to be able to determine the diameters of the inlet with an exactness of one or two millimeters in such instances is of utmost value.

DR. WILLIAM THALHIMER, of Milwaukee, Wis., presented (by invitation) a paper entitled **Treatment of Excessive Vomiting of Pregnancy with Insulin and Glucose.** (For original article see page 673.)

DISCUSSION

DR. W. M. FORD.—May I ask the doctor if he attributes the vomiting to an increase of the ketogenic bodies in the blood? If so, why does he concentrate his treatment on increasing the carbohydrate intake and the carbohydrate metabolism? Is it because he feels that the increased carbohydrate metabolism, the so-called "fire of the carbohydrates" is what burns up the ketogenic bodies, or rather prevents their formation by oxidizing the fats in the flame of the carbohydrates? If this is his theory why is nothing said about the examination of the blood sugar throughout the entire course of the treatment of these cases? If there is a deficiency in blood sugar it would be perfectly logical to put a large amount of glucose into the blood stream and to administer the insulin in order to increase the metabolism of the carbohydrates, thereby increasing the carbohydrate fire which would burn up the fat which is the only source of the ketogenic bodies. However a deficiency of blood sugar has not been demonstrated by a single report of a blood sugar examination. A urinary sugar reaction in the pregnant woman is very often misinterpreted. Two or three such cases have been called to my attention, and on careful examination it was discovered that the condition was not a glycosuria but a lactosuria which gave the sugar reaction. May I ask Dr. Thalhimer whether in his cases steps have been taken to determine if the sugar reaction was a true glycosuria? I would like also to know how he accounts for a rapid disappearance of the acetone and the ketogenic bodies from the blood when he has administered glucose and insulin, because as I understand the situation, the insulin and the glucose increase the metabolism and prevent the formation of additional acetone bodies by completely oxidizing or burning the fats; the fats being the sole source of origin of the ketogenic bodies. These acetone bodies already formed must be in stable combination and must be eliminated through the kidneys and lungs. Has anything been done to obtain evidence of increased basal metabolism as the result of the administration of insulin and glucose? How do you account for the increase of the alkaline reserve without the administration of alkali to neutralize the acetone bodies in the blood, except by the elimination of the excess of acetone bodies through the kidneys, a process stimulated by the administration of large quantities of water, but slow at best?

DR. A. B. DAVIS.—These cases of so-called pernicious vomiting sometimes present the most distressing complications and sometimes are apparently the most hopeless cases that we have to deal with. Within a year I have had two cases of excessive vomiting, one of them in the early months of pregnancy, which turned out to be a hydatid cyst without any bleeding. In another case, vomiting continued in spite of glucose, not given intravenously it is true, but still well

given. The condition became dangerous and we found a small dead fetus with cysts about one-quarter the size of rice seed all through the little premature placenta.

It seems to me that we have to keep those cases in mind, and I doubt very much if this treatment would be efficacious in such instances.

DR. HAROLD BAILEY.—I have been very much interested in the administration of sugar by vein ever since Dr. Titus visited us here some years ago. He was kind enough to send on slides of the livers of five cases that had died after the administration of sugar. One was a case of acute yellow atrophy, one was a case of early vomiting, and the others were cases of eclampsia. The pathologic picture as regards the liver was not present in these slides. It is true they all showed some colloid or other degeneration, but in the eclamptic cases hemorrhages were entirely absent and also embolism of the vessels around the bile ducts.

Before insulin came out, I used the sugar in a number of cases of pernicious vomiting and I must say that it produced a most striking effect. In the administration of sugar I gave only 25 grams in twenty-four hours and repeated it, using a 10 per cent solution. However, I was brought to a standstill after I administered 25 grams of sugar, without insulin, in a case of acute yellow atrophy at the seventh month. The patient had a hyperglycemia, with a temperature rising to 108°, and died very promptly. Shortly after, within the last six months, one of my colleagues on the service had a case of vomiting in the early months in which sugar with insulin was given and death followed in a few hours. It seems to me that there is some danger atached to the injection of sugar into the vein, with or without insulin.

Some of the sugar preparations were not perfectly clear and the doctor has suggested to me that possibly there was some other drug in the solution; as to this I can only state that it came out of the operating room in the regular course.

There are two points that have impressed me in the discussion of this subject. In the first place, if the sugar is given for acidosis then why not give it in cases of eclampsia that have a marked acidosis, some of them as low as 16 or even 12. Most of the vomiting cases are around 40 or 38, so it would seem logical, if it is the acidosis that is being treated, that these eclampsias receive the sugar. It appears obvious, to me, that the cure of the vomiting cases by the administration of sugar is not effected by the clearing up of the acidosis, which is mild, but in some other way. It may be that the presence of glycogen in the liver enables the patient to withstand whatever toxin is besetting her and we have experimental evidence that sugar acts in this manner.

DR. GEORGE G. WARD, JR.—I would like to know what method the doctor uses with his apparatus for determining the temperature of the solution. I am interested in that because we use glucose and gum at the Woman's Hospital, as a preventive of acidosis, not in pregnancy, but in cases of postoperative shock. We have a Bovée thermometer which is inserted along the course of the rubber tube and is most convenient for determining the temperature at the time the solution is given. One of my associates, Dr. Farrar, has made a great many observations on the CO_2 combining power and has determined in normal women that the average rate is 55 per cent.

DR. G. H. RYDER.—I want to endorse what Dr. Thalhimer has said by reporting one case of excessive vomiting of pregnancy, treated after the methods outlined by him. The patient was a young woman in her second pregnancy. She is reported to have had excessive vomiting early in her first pregnancy, but was not under my observation until this was over. During the first five months of her

first pregnancy when she was under my care she had occasional periods of vomiting only, but was in good condition and had a normal confinement and puerperium, with a healthy baby.

In the second pregnancy, she came to me at the end of the second month, with moderate vomiting, which rapidly became alarming. She was sent to the hospital and after treatment by diet and colon irrigations, in a week seemed well again; the vomiting has ceased and she regained her appetite. Her CO_2 absorption test showed 56 per cent. After being at home a short time, however, the vomiting returned gradually, and in spite of treatment grew worse. She was readmitted four weeks later in an alarming condition.

On admittance her CO_2 absorption test or alkali reserve was only 29 per cent, with urine full of diacetic acid and acetone, with a small amount of bile. Her tongue was dry and her pulse was rapid and she looked very sick. It seemed as though she must be curetted at once to save her life. Before doing this, however, it was decided to try the method of intravenous glucose infusion with insulin as outlined by Dr. Thalhimer.

The day after admission, the patient was given by vein 850 c.c. of a 10 per cent solution of glucose with 18 units of insulin. She took it well and was decidedly better the next day, though still vomiting. Her alkali reserve had risen to 38.2 per cent, however, though the urine was little changed. A second treatment similar to the first was given. This was followed by marked improvement in every way, though there was still a little vomiting. The alkali reserve rose to 53 per cent. The next day with no intravenous treatment it rose to 57.6 per cent, but dropped the following day to 46.2 per cent. A third intravenous treatment was given at once and the next day the alkali reserve was 58.6 per cent. The fourth and last intravenous treatment of the same amounts was given and two days later the alkali reserve was 57.6 per cent. The patient was now out of danger, looking and feeling well, vomiting occasionally only. The diacetic acid, acetone and bile decreased slowly but surely, and ten days after the last treatment the urine was entirely normal. The patient left the hospital shortly after, and through the rest of her pregnancy was very well with no vomiting. She was confined at term, giving birth to a normal child, and having a normal puerperium. Her placenta on careful microscopic examination was found normal.

DR. THALHIMER (closing).—Dr. Ford has asked a number of extremely important questions. Unfortunately because of my present knowledge, I would say it would take about two years of intensive work to answer some of them.

As far as the blood sugar is concerned in relation to disturbed carbohydrate metabolism, the blood sugar is not excessive in these cases, and if there is a perverted carbohydrate metabolism it must be of a different kind than in diabetes. As far as the relation of fats, ketogenic bodies and antiketogenic bodies to the action of insulin is concerned, I think we have some data, more theories and very little knowledge. The Schaeffer ketogenic-antiketogenic theory has recently met with some experimental data which seem to show contradictory evidence. There is some evidence to indicate that insulin may have an important direct effect on the metabolism of fats and directly cause the disappearance of ketone bodies instead of causing this only through its action on carbohydrate metabolism.

As far as the glycosuria in some of these cases of pregnancy is concerned, a great many patients have been condemned as diabetics because of having a supposed glycosuria when it has been a lactosuria. Nevertheless, there are quite a number of well authenticated cases on record where a temporary glycosuria has been demonstrated (not by the yeast test, but by other tests, as yeast is a very uncertain test).

We have not done to date any basal metabolic tests on these cases. This is something that will have to be done in clinics which are especially equipped for this kind of work. How the administration of glucose alone, or the administration of insulin alone, or with glucose, causes a rise in the alkali reserve I do not think anybody knows. I do know that when a rabbit that has been fasted overnight and has a blood alkali reserve of about 60 volumes per cent, is given enough insulin to throw the rabbit into convulsions, blood taken after a convulsion has shown its alkali reserve increased to 90 volumes per cent. Why this occurs is going to require considerable investigation.

As far as vomiting patients with hydatid mole, etc., are concerned, they are, of course, extremely interesting cases and the problem which I think would arise might be that the rapidly-growing hydatid mole, which is made up of the same, or similar, kind of tissue as the placenta in normal pregnancy, might have a similar effect on metabolism as normal pregnancy has.

Concerning the amount of glucose to be given Dr. Bailey was good enough to say a few words to me before he asked the question. It seems that men have not courage enough, or for some other reason do not want to give large enough amounts of glucose to these patients. It is extremely important that large amounts should be administered, and these figures which I have given as to the amount of glucose and insulin that we now administer were not arrived at suddenly. We did not care to give glucose intravenously to these sick people without being extremely careful about it. At first when small amounts of glucose and insulin were given no good effect resulted. We gradually increased the doses of both of these substances and now we know we can get results. As an example of this in another type of patient, we have given 100 grams of glucose twice a day for three days combined with 30 units of insulin (200 grams of glucose and 60 units of insulin) to a patient after partial gastrectomy for carcinoma of the stomach. She was over sixty years of age, was very much emaciated and received all her nourishment and fluids during this interval into her veins. Her pulse did not rise above 80 after the operation. Therefore so far as the carbohydrate metabolism is concerned, we think it is possible to feed a patient almost indefinitely into the veins with carbohydrates and this is certainly possible if insulin is given also.

Dr. Bailey mentioned the possibility of danger from giving glucose solution intravenously. We also nearly had a disaster. We had been administering glucose intravenously for years before the discovery of insulin and had been able to determine what glucose does alone and what it will do with insulin, for example, in preparing patients for operation. We were preparing a patient for operation by giving her some insulin and glucose and she almost died. We could not tell whether this was caused by the insulin or by the glucose, but thought it was the effect of the insulin although we had never had such a reaction before. A second patient had a similar reaction and then an opportunity came to give some of the glucose solution to another patient without insulin and she had a similar reaction. Therefore this was caused by the glucose. In some unaccountable manner the glucose had been contaminated with camphor. We use Merck's C. P., but it may become colored. If the autoclaved solution has even the merest trace of color it is immediately thrown out. Since then we have given hundreds of glucose injections, many of them without insulin, but certainly there have been fifty or one hundred patients who have received glucose and insulin and we have never had any other accidents. The worst that occurs is a rise of one or two degrees of temperature, such as may occur after intravenous medication of any sort.

The question of acidosis of eclampsia opens up a tremendous subject. Here the picture is complicated by renal involvement, disturbance of the salt metab-

olism, etc. We gave insulin to one eclamptic with an alkali reserve of 33 and she was only partly benefited by one injection of glucose and insulin. In her case various other methods were used and she recovered. Nevertheless immediately after three hours during which the glucose solution ran into the vein, the blood alkali reserve rose from 33 to 43. We have not tested the temperature of the glucose solution as accurately as Dr. Ward has. The hot solution with which we start, runs rather slowly and has time to cool off in the tube but we keep the solution warm with a flexible electric pad which folds over the tube and a glass connecting piece in the tube.

DR. GORDON GIBSON presented a report on the **End-Results with the Emmet-Baldwin Operation for Procidentia.** (For original article see page 637.)

DISCUSSION

DR. JOHN O. POLAK.—The principle of putting the cervix back and holding it back is the principle that cures prolapse, because if the cervix is in the hollow of the sacrum and can be kept there, by whatever method is used, the uterus will not come down.

DR. GEORGE G. WARD, JR.—I have not as yet done this operation, although it originated in the Woman's Hospital, and in the record room today we have the original volume of histories which shows the beginning of this operation in drawings made by Dr. Emmet. The two lateral denudations down the anterior vaginal wall for the cure of cystocele are plainly shown in that original volume of histories, and later on Dr. Emmet's modification.

It seems to me that we should not lose sight of the fact that this operation is really Dr. Emmet's contribution to gynecology as far as prolapse goes and it should be at least known as the Baldwin-Emmet operation. As far as the modifications by Dr. Baldwin are concerned, as I see them, the principle is still Dr. Emmet's. Suturing the edges of the denudation with catgut first, then passing the silver wire sutures are the chief modifications. One can see that that spreads out the denudation and makes a more certain broad apposition, a more perfect apposition when the silver wire sutures are passed, and is undoubtedly a distinct improvement.

DR. GORDON GIBSON.—Those of us who worked with Baldwin and were enthusiastic about this operation called it the Baldwin operation, but it really was the old Sims-Emmet operation, although Baldwin's modifications of it made it much easier to do by bringing denuded areas together and spreading out surfaces so that they lie right there in front of you.

The other modification was that Dr. Baldwin took a very much deeper bite of the tissue than either Sims or Emmet. They simply picked up the edge of the fascia and the mucosa without underlying the whole area.

In regard to the other point about the cystocele: if you think for a minute what happens to a bladder when a woman develops a cystocele you will realize that the trigone is stretched and spread out, and in doing it this way at first there is a slight puckering of the vaginal mucosa, but that disappears within a very short time and it is a very rare thing to have any dysuria or any trouble with the bladder at all.

To Dr. Halsted I would say that it is interesting to see these cases afterwards: the uterus stays in position. While you are doing the operation, the minute you stitch the cervix back with the patient in the Sims position and slight Trendelenburg, the fundus falls forward. Most of these cases are past the menopause,

and the uterus is about one-third the size of the cervix. So far as subsequent delivery is concerned, in cases that become pregnant any difficulty in this respect is obviated by cutting the bridge which remains and in that way the patient is able to go through normal delivery.

As far as the secretion is concerned, we have never seen any trouble from that. A little tunnel is formed and what secretion there is there runs out.

To revert for a moment to what Dr. Halsted said: it is not necessary to tell the patient she must have a cesarean section. There have been a good many women who have been delivered normally after this operation. I have one case where the doctor did not recognize the condition. If you do, it is very easy, as I have said, to cut down that bridge and she can be delivered in the normal way. I have two cases that delivered themselves normally, without any trouble.

The whole secret of the operation, of course, is the silver wire. Catgut will cut out; it will give way long before you want it to. One of the questions that almost everybody asks is why silkworm-gut is not used. The reason is because it also cuts out. Silver wire stays in the tissue. Sometimes the tissue heals over it and at the end of four or six weeks when you want to remove it it is hard to find. Unless you have seen how it acts in the vagina it is hard to believe that, but, nevertheless, it is true. The trick is in properly twisting and shouldering it. That is something one must learn.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF DECEMBER 4, 1924.

THE PRESIDENT, DR. EDMUND B. PIPER, IN THE CHAIR

DR. EDWARD H. RICHARDSON (*Associate in Clinical Gynecology, Johns Hopkins University Medical Department*), read a paper entitled **Three Types of Ureteral Pathology Encountered in Women.** (For original paper see page 678.)

DISCUSSION

DR. FLOYD E. KEENE.—Dr. Richardson emphasized the value of urologic studies in gynecologic diagnosis. I am most thoroughly in accord with him. Symptoms referable to impaired bladder function are very commonly present in gynecologic cases; while most commonly these symptoms are due to pathology of the urinary tract secondary to pelvic pathology, we frequently find that there may be a coincident lesion in the urinary tract or the gynecologic lesion may be of minor importance as compared to that in the kidney or bladder. The symptom common to all these conditions is deranged bladder function and an accurate interpretation and consequently intelligently applied treatment can be arrived at only by a thorough urinary study. We make it a rule that a cystoscopic examination must be done in every patient presenting bladder symptoms irrespective of the pelvic pathology and in numerous instances our efforts have been rewarded by uncovering lesions which otherwise would never have been suspected.

DR. RICHARD NORRIS.—I believe that Howard Kelly was one of the first to suggest the possibility of ureteral injury during pelvic surgery. I likewise have had some very interesting cases, one analogous to that reported tonight. The catheter straightened out the kink, relieved adhesions preventing spontaneous opening which subsequently occurred without any other operative procedure. I

have ligated ureters accidentally and had to reopen the abdomen within twenty-four hours. Before releasing the ligatures, longitudinal incisions in the ureters, to help identify them, were made and these incisions were not sutured. They closed spontaneously and the patient recovered promptly. I have had the ureter injured by enucleation of a parovarian cyst in the depths of the broad ligament with subsequent abdominal fistula that finally closed spontaneously. From the obstetric standpoint I have seen two cases of high forceps operation with deep tears which have produced adhesions, kinks and traumatic strictures which have been relieved by ureteral catheterization. So I agree with all that Dr. Richardson has said. Urology is an integral part of gynecologic work. It is a special study by men especially trained in this work. A great deal of this work, unless done in the most skillful way, is dangerous. Much injury has been done by indiscriminate study; infections have been introduced into the urinary tract, particularly by men who are not expert.

DR. GINSBERG.—Very often we meet cases with renal calculi on one side and all the pain on the opposite side. The case reported in which rupture of the pelvis of the kidney had occurred was rather surprising to me as I did not know it was possible by the gravity method. The fact that urologic cases are often operated on for some other condition is sometimes brought out at the Jefferson Clinic. In the gynecologic department it is not unusual to see patients who have been operated for salpingitis or chronic appendicitis, when after thorough examination the trouble is found to be in the ureter or kidney. I do not believe I am exaggerating in saying there is hardly a week in which we do not see patients in whom some form of abdominal operation has been performed and who come to us with the same pain complained of previous to operation and we often find the trouble to be in the urinary tract.

DR. GEORGE M. LAWS.—I should like to ask about the plastic operation for reconstruction of the lower end of the ureter. Some years ago, in looking up methods of dealing with an ureterovaginal fistula, I found a similar operation described by Dr. Kelly as feasible. In Dr. Richardson's case the ureteral end of the fistula was one and a half centimeters above the ureteral meatus. In my case it was much higher and the operation was not attempted.

The case with hematuria on one side and stricture on the other is particularly interesting because it showed beyond doubt a definite cicatricial condition. At Dr. Hunner's visit to Philadelphia recently, doubt was expressed as to the pathologic findings in the stricture area. I think we all have accepted cheerfully the idea that strictures are common and Dr. Hunner's principles of treatment but we need more demonstrated proof of the actual pathology as encountered at operation.

DR. STEPHEN E. TRACY.—Dr. Richardson's paper emphasizes several points.

First: That patients with obscure lower abdominal and pelvic symptoms should have a thorough investigation of the renal system. We all agree with Doctor Richardson that cases of ureterovaginal fistula following hysterectomy, unless they close spontaneously within a short time, should be operated upon and dealt with according to the conditions present. I have always felt that a spontaneous closure of an ureterovaginal fistula was accomplished by the scar tissue closing off the ureter with the loss of function of the kidney.

Second: The danger of injecting fluid into the pelvis of the kidney for the purpose of making pyelograms. There is no doubt that many kidneys have been seriously damaged as a result of this procedure. The gravity method which Doctor Richardson used is undoubtedly the safest, but even this is accompanied

by considerable risk as was evidenced by his case. It requires little pressure to force the fluid from the pelvis all the way through the substance of the kidney. We have done this deliberately on a few patients on whom a nephrectomy was to be performed. A day or two before the operation, the ureter on the diseased side was catheterized and fluid injected into the pelvis with only a moderate pressure. At operation, part of the fluid was found between the kidney and the capsule.

Third: That it is important to investigate both sides as it is a well-known fact that the symptoms may be on one side and the pathology on the opposite side.

DR. EDWARD A. SCHUMANN.—There is one point in Dr. Richardson's case not clear to me; that is hematuria on one side and stricture on the other.

DR. RICHARDSON (closing).—The treatment of ureteral fistulae varies according to the location and type of pathology with which one is dealing. The invaginating operation employed in my case is applicable only to cases in which the fistula is close to the bladder. The important point to be borne in mind is that besides the fistula there is practically always an associated ureteral stricture to be dealt with by repeated dilatations, if cure is to be effected. The advisability of attempting conservative treatment where the fistula is high up in the ureter must be determined by the exercise of good surgical judgment. Each case presents specific problems and no blanket rules can be laid down.

With reference to the question of the explanation of the hematuria in my second case, I am also in the dark. The most exhaustive study of the right side revealed nothing more than a scarcely perceptible narrowing of the ureteral lumen within the bladder wall, and yet all of the bleeding came from this side, being repeatedly associated with violent attacks of renal colic. Both the hematuria and the acute attacks subsided after the stricture on the opposite side was successfully treated.

I have not seen any instances of ureteral fistulae following the use of radium in the pelvis. Vesicovaginal fistulae from this cause are far commoner.

In conclusion I wish to sanction all that Dr. Keene said about the intimate association between female urology and gynecology, and to make a plea for the more frequent use of the cystoscope in the routine diagnostic study of women.

NEW YORK ACADEMY OF MEDICINE

SECTION OF OBSTETRICS AND GYNECOLOGY

MEETING OF JANUARY 27, 1925

MISS CAROLYN C. VAN BLARCOM presented (by invitation) a paper entitled **Provisions for Adequate Maternity Care in the United States.** (For original article, see page 697.)

DR. FLORENCE MCKAY, Albany, N. Y., presented (by invitation) a report on **What New York State Is Doing to Reduce Maternal Mortality.** (For original article, see page 704.)

DR. AUSTIN FLINT discussed **The Responsibility of the Medical Profession in Further Reducing Maternal Mortality.** (For original article see June issue.)

DISCUSSION

MISS ALTA DINES.—The Association for Improving the Condition of the Poor was incorporated in 1843, pledged to care for the health, as well as the other family welfare problems of those who came under its care.

For many years the work was done by volunteer workers. Then in the nineties they began having paid workers; but these visitors soon discovered that they really didn't know enough when there was pregnancy; what to advise the mothers as to their proper care. Therefore, in 1907 this organization started prenatal work, the first, I believe, in New York City.

Pregnancy has always been a very prominent problem to meet in family welfare work. In 1925, out of 5,106 families cared for there were 1685 expectant mothers, or about 37 per cent of those families.

In the Italian section we have a population of about 35,000 people, and during 1923, it was found that 77.3 per cent of the deliveries were midwife deliveries. This indicated a very special need for prenatal work. The A. I. C. P. nurses gave to 58 per cent of those who were delivered of babies, prenatal care.

In the colored district there is a population of about 50,000. Here 94 per cent of the mothers delivered of babies were under the care of the A. I. C. P. for prenatal service. There is a very special problem there, namely, the great complication of venereal disease, and of the total number of births in that district almost 25 per cent of the women had syphilis. Here we have a different picture. Only 1.7 per cent of those colored women are delivered by midwives; 94.2 per cent are delivered either in the hospitals or by the outpatient services of the hospitals. We have had startling results. The mortality rate has decidedly decreased in the colored district. In the Italian district the maternal mortality was already low, but there has been an improvement of 10 per cent in the infant mortality in that district in five years. They did need and they do need to be taught how to care for the babies when they come into the world. Of course, the stillbirths and other difficulties coming from syphilis have been very marked in the colored district.

DR. FREDERICK W. RICE.—I do not think there is any question that those who have studied this matter of reducing the high maternal mortality, will agree with Dr. Flint when he says that education of the public must come first, and then, with the education of the public in this subject and the demand for better maternity care, will follow educated medical attention in these cases. However, I disagree with him when he says that we can get immediate results through the medical profession by giving them standards in the management of the normal case. I think it is a very difficult thing to educate the public, and I also think it is a very difficult thing to educate the large part of the profession, now practicing, to limit their practice to the normal case and avoid operative interference. I think the way it is now being attacked is going to give results in the next five or ten years, that is, by means of the work that is being done through the states, by the Sheppard-Towner Bill organizations such as the maternity centers and organizations connected with other welfare associations. It is through such agencies, through nurses reaching the mothers, that they are going to realize the importance of carrying out the rules of hygiene in protecting them through pregnancy.

As far as sepsis goes, I think it is going to be some time, simply from the

fact that none of these organizations, state, federal or local, has anything to do with the actual delivery of the case. They can protect the mother through pregnancy and tell her how to take care of herself so as to avoid toxemia of the severe type but when the actual delivery comes, that is when sepsis occurs. In the last ten or fifteen years, in England, where the number of midwives has increased perceptibly, the number of doctors called in by midwives is increasing all the time, and I think, until we actually supervise and weed out these ignorant women who are practicing in the Southern states and the scattered districts, we are going to have a continuously high sepsis rate. I believe that work can only be done through trained nurses, but much differently trained than the nurses described by Miss McKay. They must go out not as midwives, but as instructors of midwives, and I think until that time comes we will not get results.

DR. HAROLD C. BAILEY.—It occurred to me while Miss Van Blarcom was talking about the differences of nationalities and of distances in our country compared with others abroad, that that possibly offers a very easy explanation for us, but, as a matter of fact, from actual figures in our own state, we find we are 20 points below some others in the United States Government registration area. Therefore, we can hardly claim that the mountain whites and the colored women increase our mortality as much as we would expect that they do, and therefore we will have to find some other way to explain this high rate.

New York is the best city, or was, in the last two or three years, in the country according to the records, as regards maternal mortality and still the rest of the state has a figure which is considerably higher. Consequently if our teaching only takes care of those immediately about it, we are doing very little good.

There is another point, namely, the division of the responsibility. We have, of course, the midwife, the doctor, and the hospital. Here in our own town we have reduced the incidence of midwives from 40 to about 20 per cent within the course of a few years, the last report showing that there were only 27,000 midwife deliveries in the city as against some 49,000 ten or twelve years ago; so it would seem as if the midwife, as a problem in this particular city, did not enter very much into our discussion. At any rate, she is a recognized and supposedly trained person, and she handles only normal cases.

I think there is no question that the doctor who practices general medicine and takes obstetrics as a side issue is the man at fault to a very considerable extent, and if we follow what Dr. Flint has suggested and demanded, or if the public follows and demands what he has suggested, namely, that surgery be done by surgeons, we very likely would have the abnormal and delayed labor cases removed to the hospital for care by those who are trained and competent to handle such cases.

DR. FREDERIC C. HOLDEN.—Notwithstanding our improved educational facilities, prenatal care, theoretical and practical training, we have increased our maternal mortality. Why? A large group of medical men will never be obstetricians. They know the theory of obstetrics, but they have no mechanical common sense to make a combination of the theory and the practice.

DR. RALPH W. LOBENSTINE.—Regarding medical education: in the first place, all medical students should be taught the value of prenatal care, even though the maternal mortality has not improved. I myself question that fact despite our statistics. I think maternal mortality has improved and that the reason it apparently has not improved is because we are getting more accurate statistics. Secondly, Dr. Flint brought out that conservatism is the point that

the medical student and the older doctor must always have in mind, unless he is a specialist, and he should practice conservatism up to a certain point, but you cannot compare the work of the specialist and the internist in obstetrics any more than you can in surgery. Third, in order to improve medical teaching you must have more autopsies, particularly of babies.

Just a word from the public health standpoint. In rural communities the greatest blessing, as I have often said before, outside of the doctor at the actual delivery, to the poor woman, is the nurse. If you get outside of this small environment of ours, where we have every facility, and that of cities like Boston, Philadelphia and Chicago, the facilities are very bad, and that is true of all rural centers where we have great distances and few doctors, and under such conditions what is a poor woman to do unless she has a nurse there to help? If she cannot get the doctor she must have some member of the family to help her out. The next step in attacking this problem in the rural districts is in the specially trained nurse, or the nurse trained in a specialized subject like obstetrics.

One or two things must happen in the country if conditions are going to improve. We must have nurses, with an obstetric training to help out the doctors in those districts. It is all very well for us to say that the communities have plenty of doctors and the roads are good and doctors have automobiles and they can get to the patients. They cannot do it. Miss McKay will tell you that they cannot do it, despite reports to the contrary. If you have scattered throughout the country certain groups of these specialized nurses who can get to the patients when the doctor cannot and will stay there until the doctor arrives, conditions may be improved.

The third and last thing that I want to touch upon is this: if you can get more hospitals to serve two or three counties where the population is not large, then with a system of motors, etc., you can get the abnormal cases easily to the hospitals and thus improve conditions.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

A REVIEW OF THE GYNECOLOGIC LITERATURE OF 1924

BY SYDNEY S. SCHOCHET, M.D., AND JULIUS E. LACKNER, M.D., CHICAGO

AN almost marvelous development of knowledge in the domain of medicine has taken place during the past decade, with its numerous channels extending into every branch of the medical sciences. During the same period, and especially during the past year, the speciality of gynecology has shown even more readiness to adopt new views and new methods of examination, with the result that the careful clinical study of patients, with its traditional time tried methods, is replaced with too many laboratory tests. The great dangers attending this revolutionary development in gynecology are, that discovered facts will be accepted too freely as explanatory, when in reality, they do not explain. As a result, investigation and real progress in gynecology will finally be hampered instead of aided.

Aside from the suggested teachings of the workers in the biochemical and fundamental subjects, who have over-evaluated proposed methods in gynecology, there are still other men of real worth and whose high authority and exact knowledge we recognize, who have suggested the *passing of the gynecologist per se.* John B. Deaver[20] in a recent paper discusses the *passing of the gynecologist.* While the general surgeon continues to invade the pelvic regions in the removal of tumors, or in the performance of hysterectomies, there is no doubt that plastic surgery of the female genitalia requires the more exact skill of specifically-trained men, which the average general surgeon does not possess. There is no teaching more dangerous than to encourage the general surgeon to invade the pelvic brim. Cullen[18, 19] and Hirst [44] have clearly presented the great advances made by gynecologists, not only in the treatment of pelvic lesions, but in surgery of the bladder, and emphasize the necessity of more careful training of men in this specialty, as illustrated in a sketch of the life and work of David Tod Gilliam.

While the recent advances in biochemistry and allied subjects have established numerous facts, which no amount of unwillingness to believe can set aside, yet the actual clinical value of these tests, employed by the modern gynecologists, has not been properly evaluated, with the result, that many misconceptions have grown through incomplete and partial knowledge of the allied sciences. The importance of basal metabolism, blood chemistry and studies of physical condition of blood

cells have received special emphasis by many gynecologists during the past year, yet a word of warning as to their proper clinical evaluation is not amiss in a review of this character.

Hafkesbring and Collett[39] have shown the marked variations of the daily basal metabolism of two individuals over a period of four months. The maximum variations were plus 12.8 per cent and minus 9.5 per cent in one patient and plus 8.8 per cent and minus 14.4 per cent in the other patient. Studies of the variations of blood sugar content of patients with different pelvic lesions, both before and after operative procedures, were made by Paroli.[70] While the results are interesting, their value should not be overemphasized. Likewise many investigations of the sedimentation of blood cells have been recorded, and employed as an index in the prognosis and operability of a case. Burckhardt-Socin[10] calls attention to the nonspecificity of this reaction. However there appears to be some relationship between rapidity of sedimentation and tuberculosis. Yet it should be born in mind that even physiologic processes, as menstruation and pregnancy, influence sedimentation. Becher Rüdenhof[3] concludes that the test at its best is of diagnostic value in a limited number of diseases, while Hildebrandt[43] believes, that it is of real value in inflammatory lesions, but may fail completely in diseases which are accompanied by great destruction of cells, and is of little value in ectopic pregnancy. On the other hand, Flores,[27] in a study of 100 clinical cases, concedes a great diagnostic value to this test for inflammatory processes, tubal pregnancy, and in the differentiation of benign and malignant tumors.

If the reader recalls the fact that the more exact serologic fixation tests for syphilis have replaced the hundred or more different precipitation tests advocated in the diagnosis of syphilis, it is evident to the gynecologist that we should at least await further improvement or modifications of this sedimentation test before we add it to our armamentarium.

The subject of endocrine disturbances which received much attention in the literature during the past five years, due in part to unfortunate commercial exploitations, has not been placed on more sound grounds. Robert T. Frank[31] concludes that the critical and honest worker in endocrinology must sorrowfully confess that in far too many instances, he is still impotent to relieve endocrine disturbances. Thyroid extract is the sole endocrine product which fully substitutes for the action of an endocrine gland. Pituitrin is of use in but few endocrine disorders, namely, diabetes insipidus and in some cases of functional uterine bleeding. Frank thinks that the exalted results claimed from the products of the ovary, namely whole ovarian extract, corpus luteum, ovarian residue etc., are no more than a striking evidence of mass hypnotism.

Chemotherapy and vaccinetherapy have few enthusiasts as evidenced by a dearth of the reported cures from these therapeutic measures; although Chevrier, Fumery and Dausse,[12] in a very extensive paper, have reported 80 per cent cures in fifty cases with autovaccine therapy. But these views are at variance with many other workers in this field.

The symptom of pain, not essentially associated with any gross pathology in the pelvis or very slight errors in the pelvic organs, is no longer subjected to speculative operative measures. The trend of

thought during the past year, is to consider these unfortunate patients with anomalies of a mental make-up. Smith[91] considers two factors as the cause of pain in the neurotic woman: (1) Oversensitiveness of the patient; (2) a faulty conception of the mind of the patient as to the integrity of her sexual organs. Ries[77] in a recent paper on "that pain in the vagina" concludes that the sex organs are secondary to an abnormality in a mental constitutional make-up. Heinsius[41] considers that many gynecologic symptoms of this group of cases are due to a disturbed relationship of the vegetative nervous system, especially of the parasympathetic system. From the many conflicting views of pain in the neurotic individual, we arrive, therefore, at this, that mere theories do not offer an adequate explanation of these symptoms, nor does it seem advantageous to assign these apparently functional disturbances to one common group.

Heaney[40] reports 439 administrations of ethylene and oxygen in his gynecologic and obstetric practice. Of this group, ether was required in 111 cases. Heaney concludes that this anesthetic is without an equal for diagnostic examinations that require anesthesia, and is of special benefit to the patient who is a peculiar surgical risk, particularly the patient requiring cesarean section. The quickness of the induction, the freedom from struggling and asphyxia are very important in these cases. The child cries promptly and the uterus behaves as when nitrous oxide is given. Magid and Klein[56] report a series of cases under sacrotranssacral anesthesia and conclude that this form of anesthesia should be employed more often in plastics. Fritz Peyser[73] calls attention to the fact that women are more susceptible to an anesthetic than men, and are not so well suited for the administration of local anesthesia. Unpleasant after-effects following lumbar anesthesia have been observed much more frequently in women than in men. One of us[86] observed a death from spinal anesthesia in one of our well-known teaching institutions. No definite lesions were present to explain the sudden death other than the form of anesthesia.

Miller[62] reports a case of construction of an artificial vagina with the Baldwin operation. Although the results from the marital viewpoint were reported satisfactory after a period of two years, Miller questions whether one is justified in advising so radical an operation in similar cases.

Morrer[66] reports excellent results in the treatment of pruritus ani and vulvae with the infiltration of the areas with quinine and urea hydrochloride solutions in strength of 0.5 per cent. The author states that the results with this method are as good as after a Ball or Lynch operation and much better than those obtained with actual cautery. Lackner[56] failed to obtain any relief with this method or with novocaine solution in a series of ten cases.

Montague[64, 65] made a bacteriologic study of pruritus in a series of 44 cases of which 20 had rectal diseases in which pruritus of the anus was absent; 14 had pruritus without rectal pathology. In addition five normal persons were examined as controls. The striking findings, were that of 1700 sections of tissue examined, bacteria could only be demonstrated in 74 of the sections. From this study the author concludes that the staphylococci and B. coli were the probable infective agents in pruritus of the perineum.

Schochet[87] has made a very careful study of granuloma inguinale with the report of a case. The author emphasizes the necessity of more careful study of ulcerations of the external genitalia, and collected sixty-four reported cases of this tropical condition observed in the United States during the past five years.

Tourneaux[94] reports a case of kraurosis vulvae. Although few reports and studies are found in the current literature, this condition is not uncommon in hospital dispensaries. The writers[54, 86] of this review observed several cases in the Michael Reese Hospital Dispensary during the past year. In some cases ovarian therapy gave slight relief. However if we remember the pathology of this severe affection, an atrophy and fibrosis of the connective tissue beneath the epithelial layer, radical excision of the vulva is probably the only real cure of these unfortunates.

Goldstine and Fogelson,[34] in a very careful and extensive study of adenomyoma of the rectovaginal septum, have arrived at a similar conclusion with R. Meyer, namely, that these growths are of an inflammatory origin even though glandular structures are often present in regions of apparently aseptic areas.

CERVIX AND UTERUS

Some of the remarkable findings reported for uterine secretions must be totally beyond the comprehension of anyone possessing an extensive gynecologic experience. Isador Kross[53] reports a fibrinolytic ferment present in the uterine secretion that makes the uterine menstrual flow fluid. It is common knowledge that the normal menstrual discharge consists of large amounts of mucus with very finely microscopic clotted blood from the uterine vessels of the mucosa. Failure to recognize this fact has led to erroneous conclusions as to variations and consistency of menstrual blood. While most textbooks state that menstrual blood does not coagulate, a careful microscopic examination of the menstrual flow will clearly demonstrate that this view is untenable.

The treatment of leucorrhea in children and adults has been the cause of a great deal of comment during the past year. Kahn[49] considers that vulvovaginitis in children should be treated by autovaccination and by local treatment. Stein[22] gives daily injections of one per cent mercurochrome ointment into the vulva and vagina and reports cures in gonorrheal vaginitis of children in seven to nine weeks; in nonspecific leucorrhea in five weeks. C. Tenconi[93] injects one per cent silver nitrate solution into the vagina, under pressure, every second day, with reported cures after fifteen injections in gonorrheal infections; after two or three administrations in nonspecific infections. We must conclude from these reports, that there still exists a difference of opinion as to curative methods in the treatment of vulvovaginitis.

The cervix may act as focus of infection just as the teeth, tonsils and appendix. Laura Moench[63] presents evidence to show the affinity of cervical streptococci for joint tissue. It is evident then, that the treatment of this site of infection is of some importance. During the past year, three distinct methods of treatment were frequently advocated. Sturmdorf's[92] enucleation of the cervix is the first, and one of the most successful. According to Kelly,[51] Guy Hunner's actual cautery

of the cervix is the best treatment of endocervicitis because it does not cause an ascending infection nor cicatricial stenosis of the cervix and it gives excellent results. Corbus[15] has devised an instrument whereby the cervix is exposed to 116 to 117° F. for thirty to forty minutes every ten days in treatment of gonorrheal endocervicitis. The French[38] report success in the treatment of endocervicitis with Filhos caustic,[25] (potassium hydroxide 5 parts, and quicklime 1 part), but this treatment must be followed by a rest in bed for several days. It is often followed by stenosis of the cervix, and the cervix must be dilated from time to time after cauterization. In Pemberton's[71] report of 18 cases of atresia of the cervix, 3 had cervical repairs, 1 tight external os due to cicatricial tissue, 1 obstructive membrane at the external os, 1 with pin point os, which was associated with tuberculosis of the uterus; vaginitis was present in 7, cervical polyps in 4. Malignancy was not present in this group.

The literature of the past year shows that there still exists a marked difference of opinion in the treatment of fibroid tumors of the uterus.[98] Fibromata which do not increase in size or produce symptoms, especially when discovered at the time of the menopause, are better let alone. Schickelé[83, 84] believes surgical interference is indicated in the following groups: Fibromata compressing neighboring organs, associated with inflamed processes; fibromata complicating pregnancy, especially pendunculated subserous fibroids; tumors which occupy a large part of the pelvis or abdominal cavity; rapidly growing fibromata and those accompanied by severe hemorrhage. He also includes fibromata treated without success by radium and x-ray. Bégouin[4] is of the opinion that radiotherapy is indicated only in fibroid tumors of the menopause, provided they are interstitial and not complicated with other lesions. Radium has certain advantages over x-ray therapy because it is more active and usually requires but a single application. Its insertion necessitates dilation of the cervical canal which may reveal important contraindications to radiotherapy. Seitz and Wintz [89] believe that all types of fibromata of the uterus, with the exception of pedunculated polypi, should be treated by the roentgen rays. George Willis[95] gives the following indications for radium treatment of fibromata of the uterus; small nonpedunculated fibroids at the menopause with hemorrhage as the most salient symptom, and especially in cardiorenal patients in which surgery is contraindicated. Cuthbert Lockyear[55] states that 55 per cent of fibroids require no treatment, 35 per cent require surgical removal and 10 per cent may be treated successfully with radium.

In the operative treatment of fibromata of the uterus, the question of conservative and radical operation is of special interest. C. Jeff Miller[61] states that myomectomy should be performed more frequently. The mortality is not greater than hysterectomy with only one recurrence in fifty cases. Pregnancy occurred in 28 per cent of the cases with myomectomy. Goullioud[36] states that myomectomy gives an average of ten years of normal genital life during which pregnancy may occur. Schickelé[84] maintains that enucleation is justified only when there is a solitary subserous fibroid. Myomectomy is not indicated in multiple fibroids because of the risk of uterine rupture.

Gynecologists continue to differ as to the operation of choice in regard to total and supravaginal hysterectomies in the surgical treatment of fibroma of the uterus, because of the frequency of carcinoma

of the cervical stump. According to C. J. Miller,[61] the above operations are equally safe in the hands of an experienced operator, but there is less danger of injury to the bladder or ureter in supravaginal hysterectomy in the hands of the less experienced surgeon. William Fletcher Shaw[90] believes that supravaginal hysterectomy is indicated in a nulliparous uterus and in multiparous uterus in which there is no damage to the cervix. With the repeated reported cases of carcinoma in the residual cervix, it is evident that total hysterectomy is indicated more often in the presence of chronic endocervicitis, and severe cervical lacerations.

Textbooks[1] continue to emphasize chronic myocarditis and degeneration of heart muscle, as characteristic of the "myoma heart," associated with fibromata of the uterus. Winter[96, 97] concludes that the involvement of the heart in myoma is not uniform and that there are no evidences of heart changes which are pathognomonic of myoma and he even questions the existence of this condition.

It is evident, from the many conflicting reports of the treatment of carcinoma of the uterus, that this chapter in the field of gynecology remains an academic question. In the many papers published during the past year, we still lack a clear conception of the method of choice for the treatment of this condition. The treatment of corpus carcinoma cannot be considered with the treatment of carcinoma of the cervix, for, it is a matter of common knowledge that the clinical courses of these two conditions are entirely different. We have in the latter condition (carcinoma of the cervix) early extensive metastatic involvement of the lymph nodes, while in carcinoma of the corpus, the tumor growth remains localized for a much longer time. In carcinoma of the fundus, Norris and Vogt[68] recommend panhysterectomy with postoperative irradiation with radium and x-ray.

European authorities, especially the French [8, 9] and Italians, advocate strongly the use of electrocoagulation with the diathermic current in conjunction with irradiation in the treatment of carcinoma of the uterus. Coagulation by diathermy is better than by thermocautery as it penetrates deeper, the tissues are sterilized with the high temperature of the electrode, and the destructive action extends far beyond the eschar into the neoplastic mass. Secondary hemorrhages are not encountered.

Ursus V. Portmann[74] concludes that the treatment of carcinoma of the cervix will be confined to radiation therapy. Radium[47, 48] is of value in operable cases of carcinoma of the cervix and is employed more and more often in the early cases, according to Thomas and Jones. John G. Clark,[13, 14] at the University Hospital of Pennsylvania, reports good results in the treatment of carcinoma of the cervix with radium. According to his conclusions, radiation and surgery have given equally good and bad results. Radium is a palliative remedy of inestimable value in a small percentage of cases. Robert Greenough,[37] member of the committee of the American College of Surgeons, on treatment of malignant diseases with radium and x-ray, arrives at the following conclusions. He reports 829 cases of carcinoma of the cervix of which 94 were free from the disease after three or more years. More than one-half of these cures were obtained by use of radium and x-ray without radical operation. There were no cures with cautery alone. Of the 243 cases that were included in the favorable or borderline groups, hysterectomy cured "one in

three'' radium with cautery ''one in three'' and radium alone cured ''one in five.'' The final conclusions were:—The method of choice in the treatment of malignancy of the uterus remains an open chapter in gynecology.

Gosset and Menod[35] value the wide abdominal hysterectomy in early cervical cancer. George Crile[16, 17] emphasizes the necessity of individual study of each patient in the treatment of malignancy of the uterus. An extensive correlation of the experience of individual observers is necessary to establish a correct basis of judgment regarding the relative merits of surgery, radium, and roentgenotherapy in the treatment of carcinoma of the uterus. Joseph Schulte[88] writes that many clinicians are using a combination of the improved operative technic plus intensive postoperative radiation. Bumm[88] reports 71.8 per cent cures in operable carcinoma of the cervix with this method.

Henry Schmitz,[85] in reporting five-year end-results in primary carcinoma of the pelvic organs, draws the following conclusions: When carcinoma of the cervix is localized, surgical interference is the method of choice. When there is doubt as to definite localization of the carcinomatous growth and surgical means are used, they should be preceded by radium and x-ray treatment. However, radiation therapy, without subsequent surgery, gives better permanent results in cervical carcinoma. Radium and x-ray therapy is the method of choice in inoperable cases and these inoperable cases are treated symptomatically to arrest hemorrhage, foul discharges and to alleviate pain. According to Schmitz' final conclusions, radium therapy of carcinoma of the female pelvic organs, compares favorably with surgical treatment.

In an editorial on carcinoma of the uterus, William Mayo[57] concludes that 71.8 per cent of patients free from lymphatic involvement are cured by operative measures and only 19 per cent are cured when lymphatic involvement is present. Radium is not indicated in patients with carcinoma of the body of the uterus, because radium rays do not penetrate deeply. No patient should receive radium treatment without surgical consultation and the decision as to surgery or radiotherapy should depend on the condition existing in each individual case.

We can only conclude from these authoritative reports that the treatment of malignancy of the uterus and the final method *par excellence*, must be deferred for some future period.

Only a passing note is given place in this review of the prominent chapters of the curative methods for displacements and retroversions of the uterus.[80] Watkins-Wertheim[60] interposition and the Ries operation are the operations for prolapse after the childbearing period. Many good gynecologists still entertain the idea that surgical operations are indicated for the harmless and symptomless movable uterus. Theilhaber[46] was the first to recognize that uncomplicated retroflexion *per se* causes no symptoms. Jaschke[46] in a series of 1000 cases demonstrates that it is inconsistent and untenable to hold retrodeviation responsible for any form of menstrual disturbance. Uncomplicated mobile retroflexion produces no characteristic symptoms.

It is evident that the first and the most urgent need in the study of cases of sterility is a very careful examination of the male and female parts. Even though the male spermatozoa are live and viable and the female parts normal, there still remains the question of

biochemical and biologic differences or incompatibility of the semen and ovum. Orlowski[49] calls attention to two other groups of individuals—the "frigid" woman and the "grande amoureuse." In the first group, therapy is not successful.

Glaevecke[33] refers to the value of intrauterine application of formalin in cases with mild endometritis and reports successful results in 65 per cent of these patients. In passing, it may be of interest to call attention to the marked edema of live tissues to the action of formalin.[2]

In a study of tubal patency, Bonney[7] alludes to the frequency of stricture or occlusion of the tubes although the routine tactile examination reveals normal organs. Huhner[45] has made a very extensive study of the diagnosis of sterility with the Rubin patency test and has supplemented this by determining the virility of the spermatozoa and the receptivity of the female genitalia. Immediately after coitus, the woman comes to the office, is placed in the dorsal position, a bivalve speculum inserted into the vagina, and the cervical contents are aspirated into a pipette and examined. If numerous live spermatozoa are present, the cervix is in the correct position to receive the semen. If only dead spermatozoa are present, and if a previously examined condom specimen revealed live spermatozoa, the secretions of the cervix are at fault. The Huhner test is a clear and well defined procedure that should be more frequently employed. Meaker[59] calls attention to a group of cases of sterility due to spasm of the muscular coats of the tubes. One of us (Schochet), in an operative case for fibroids of the uterus, was not able to produce contractions of the fallopian tubes with direct electrical stimulation. Meaker gives the following important cause for sterility in the female: that condition where the semen is not ejaculated directly into the cervical canal or external os of the cervix, due to redundancy of the vaginal walls, vaginismus or when the tip of the cervix points forward.

Many of the conditions obstructing natural insemination can be corrected. When this is unsuccessful, artificial insemination[58] is indicated. The conditions necessary for this procedure are normal spermatozoa and a female genital tract that is normal above the cervix. The time of choice for artificial insemination is immediately after a menstrual period. This procedure must be repeated at several monthly intervals before it can be considered a failure. Obstruction in the tubes can be positively diagnosed with the Rubin test.

Robert L. Dickinson,[21] in a very extensive and exhaustive study, analyzes the various contraceptive methods, and gives a detailed statistical report of procedures advocated: jellies, pastes and effervescing tablets containing chinosol and acids show a 3 per cent failure.

There is no doubt that the studies of the patency of the tubes have thrown much light on the subject of sterility, yet there remains a large field[30] for more careful study of sterility which will yield many more new facts capable of throwing more and better light upon the underlying causes of this condition.

"It is a wholesome experience in medicine from time to time to pause long enough to take stock of our knowledge in various departments of practice and to ascertain whether we are walking in the light of sound information or merely groping aimlessly in the darkness of ignorance." (A. M. A.)

Probably no statement is more appropriate for the gynecologist when he wishes to discuss the physiologic and pathologic functions of the ovary. If we can once get oriented and understand the true physiology of the ovary, there will be no avenue open to the many writers on supposed ovarian functions, exhaustion, hyper- and hypoactivity with its supposed effect on the functional disorders of the mental and nervous system.

Kellner[50] describes many symptoms with many conclusions of a case of hypofunction of the ovary, as though we actually possessed basic physiologic knowledge of this organ.

Portze and Wagner,[75] in a study of ovaries in women with well-defined symptoms of dementia praecox (Schizo phrenia) have found a definite fibrosis in these organs. All three cases showed erotic delusions and ideas of pregnancy. With the activity of the modern psychoanalyst, grave doubt is thrown on Freud's idea of sex as a satisfactory explanation of these conditions, nor should other mental disorders be attributed to the so-called cystic ovary. (Follicular cysts.) It seems more sound not to revive the old time-honored idea of associated functional mental derangements with the ovarian processes. Schickelé,[81, 87] in previous papers, concluded that menstruations are not controlled by the corpus luteum and maturing follicles and in a more recent contribution now even eliminates the rôle of the interstitial or "thecal" gland elements in hemorrhagic syndromes of the uterus. Schickele's studies are interesting and instructive, in that they prove that the function of an organ cannot necessarily be determined by apparently logical deductions.

Probably of greater clinical significance to the gynecologist is the action of the roentgen ray on the normal ovary and the subsequent effects of radiation on the physiologic functions of the ovary. Frankel,[28] Werner, Hynemann and others report no ill effects following roentgen amenorrhea, and that women gave birth to perfect, healthy children. However, a large number of gynecologists have objected to this temporary sterilization on account of the fear that the patients would give birth to inferior individuals. Frankel, in a very extensive study of this phase of sterilization concludes that a limited period of sterilization can be obtained with graduated roentgen ray exposures and if the dose is kept within proper limits, only the most mature follicles will suffer destruction with no injury to follicles in the earlier stages of maturation. This procedure is of value for individuals in which temporary sterilization is desired, especially in cases of cardiac, pulmonary and renal diseases, where repeated excessive bleeding is deleterious to the general health of the patient. However, it is questionable whether the roentgenologist can accurately graduate the dosage in all cases so as to have a stimulating effect on the so-called ovarian function as advocated by Holzknecht's followers, especially Thaler.

In a series of experiments conducted by Driessen[24] on the effect of roentgen rays on female gonads of rabbits, the author concludes that the x-rays are germ poisons which injure germ cells present in the sexual gland. Their effect is manifested by subsequent arrest of the development of the fetus, and by inferiority of the latter. The conclusions are contrary to the opinions held by various authors, and yet, it has been repeatedly shown in many human cases that,

after irradiation, pregnancy is apt to terminate in the premature birth of a dead fetus.

Kottmaier[52] reports three cases of pulmonary tuberculosis in which roentgen castration, carried out at one sitting, was followed by a marked aggravation and more rapid course of the disease. However the author does not advocate a general resumption of surgical procedures in this group of cases, but a more conservative roentgen sterilization in several exposures.

Saidman,[78] in a recent paper, has reported unusually good results with the ultra-violet rays in the treatment of ovarian disorders in doses which produced a mild actinic erythema. Reference is made to this paper so we may more clearly see the many inroads that are being made in the field of sound gynecologic practice.

Renewed interest in the nonsurgical treatment of ovarian and tubal infections is noticed during the past year. Fekete[26] reports marked improvement following the intravenous injection of calcium chloride, and notes alleviation even a few seconds after the intravenous injection. How much of this is due to psychotherapy? The theory of its therapeutic action is based on the assumption that calcium stimulates a flow of fluid from the tissues into the blood stream, thereby decreasing the local swelling of the inflamed part. The contraindications to calcium therapy are given as bacteriemia, absence of local findings, weakness and loss of strength.

Perie[72] emphasizes the employment of serotherapy, vaccines and protein therapy. The old idea of artificial production of leucocytosis also receives special mention in this paper and particularly the Klingmuller method of injection of turpentine into the periosteum of the ileum. This procedure produces a violent local reaction with an increase in the temperature, 39 to 40° C.

Marked constructive progress has been noticeable in the study of the solid tumors of the ovary.[32] Dougal[5] reports an interesting case of primary chorioepithelioma of the ovary and has collected ten cases of chorioepithelioma of the ovary from the literature. Newmann[67] reports an unusual case of carcinoma folliculoids or folliculoma of the ovary and discusses the many diversities of opinion as to the true nature of this type of tumor. Aschner and Meyer[67] believe that these tumors arise from residual granuloma cells. Clinically, they belong to the malignant blastomas. Bishop[6] made a thorough survey of the literature of solid ovarian tumors and has arrived at the conclusion that at best, these tumors are difficult to diagnose as to malignancy and has taken a somewhat extreme view in advising radical extirpation of all types of solid tumors of the ovary.

Cahill[11] calls our attention to the relative frequency of pelvic tumors in children under three years of age. A large number of ovarian tumors found in children are dermoids and teratomas. Rainey[76] reports a case of twisted ovarian dermoid in a child of two and a half years of age. Francesco[29] studied the changes of blood vessels of tumors of the ovary and invariably found changes in the media and intima.

In a series of 296 abdominal operations, Sampson[79] reports 64 cases of endometrial implantations and emphasizes that similar implantation may occur with malignant endometrial tissue.

REFERENCES

[1]Anspach, Brooke M.: Gynecology. J. B. Lippincott Company, 1921.
[2]Bauereisen, A.: Monatschr. f. Geburtsh. u. Gynäk., Berlin, 1924, lxvii, 9.
[3]Becher-Rüdenhof, Frieda: Wien. Klin. Wchnschr., 1924, xxxvii, 545.
[4]Bégouin, P.: Bull. Soc. d'obst. et de gynéc. de Par. 1924, xiii, 255.
[5]Bergeret and Moulonguet, P.: (Dougal) Gynéc. et Obst., Paris, 1923, viii, 528.
[6]Bishop, Eliot: Am. Jour Obst. and Gynec., 1924, vii, 576.
[7]Bonney, V.: Practitioner, 1924, cxii, 137.
[8]Bordier, H., and Bouchet, G.: Arch d'électric. méd., Bordeaux, 1924, xxxii, 198.
[9]Bordier, H.: Paris méd., 1924, xiv, 84.
[10]Burckhardt-Socin, O.: Schweiz. med. Wchnschr., 1924, liv, 693.
[11]Cahill, James A., Jr.: Internat. Clinics, 1924, ii, 212.
[12]Chevrier, L., Fumery, J., and Dausse, C.: Rev. franç. de gynéc. et d'obst., 1924, xix, 193.
[13]Clark, J. G.: Ann. Surg., 1924, lxxx, 138.
[14]Clark, John G.: Internat. Clinics, 1924, i, 74.
[15]Corbus, Budd C., and O'Connor, Vincent J.: Surg., Gynec., and Obst., 1924, xxxviii, 119.
[16]Crile, G. W.: Illinois Med. Jour., 1924, xlv, 177.
[17]Crile, George, W.: Am. Jour. Obst. and Gynec., 1924, vii, 528.
[18]Cullen, Thomas S.: Ohio State Med. Jour., 1924, xx, 484.
[19]Cullen, Thomas S.: Atlantic M. J., 1924, 27:619.
[20]Deaver, John B.: Am. Jour. Obst and Gynec., 1924, vii, 299.
[21]Dickinson, Robert L.: Am. Jour Obst., 1924, viii, 583.
[22]Dorne, Maurice, and Stein, Irving F.: Illinois Med. Jour., 1924, xlv, 219.
[23]Dougal, Daniel: See reference[5]
[24]Driessen, L. F.: Strahlentherapie, Berl. u. Wein., 1924, xvi, 656.
[25]Dupont, Robert: Bull. Soc. d'obst. et de gynéc. de Par., 1924, xiii, 315.
[26]Fekete, Alexander von: Monatschr. f. Geburtsh. u. Gynäk., Berlin, 1923, lxiv, 267.
[27]Flores, Giuseppe Satta: Ann. di ostet. e ginec., Milano, 1924, xlvi, 40.
[28]Fraenkel, Manfred: Strahlentherapie, Berlin, 1924, xvi, 690.
[29]Sebastianodi, Francesco: Arch. f. Gynäk., Berlin, 1924, cxxii, 129.
[30]Frank, Robert T.: Jour. Kansas Med. Soc., 1924, xxiv, 132.
[31]Frank, Robert T.: Colorado Med., 1924, xxi, 123.
[32]Geist, Samuel H.: Amer. Jour. Obst. and Gynec., 1924, vii, 567.
[33]Glaevecke, Carl: Monatschr. f. Geburtsh. u Gynäk., Berlin, 1924, lxvii, 47.
[34]Goldstine, Mark T., and Fogelson, Samuel J.: Surg. Gynec., and Obst., 1924, xxxviii, 753.
[35]Gosset, A., and Monad, Robert: Paris Méd., 1924, xiv, 158.
[36]Goullioud: Gynéc. et Obst., 1924, ix, 268.
[37]Greenough, Robert B.: Surg., Gynec. and Obst., 1924, xxxix, 18.
[38]Guillemin: Bull. Soc. d'obst. et de gynéc. de Paris, 1924, xiii, 321.
[39]Hafkesbring, Roberta, and Collett, Mary E.: Am. Jour. Physiol., 1924, lxx, 73.
[40]Heaney, N. Sproat: Surg., Gynec., and Obst., 1924, xxxviii, 692.
[41]Heinsius, Fritz: Monatschr. f. Geburtsh. u. Gynäk., Berlin, 1923, lxv, 17.
[42]Hempel-Jorgensen, P.: Acta gynec. scandin., Helsingfors, 1924, iii, 218.
[43]Hildebrandt, Otto: Monatschr. f. Geburtsh. u. gynäk., Berlin, 1924, lxv, 275.
[44]Hirst, Barton Cooke: Am. Jour. Obst., and Gynec., 1924, viii, 1.
[45]Huhner, Max: Am. Jour. Obst. and Gynec., 1924, viii, 63.
[46]Jaschke, Rudolf: München. med. Wchnschr., 1924, lxxi, 667.
[47]Jones, Thomas E.: Am. Jour. Obst. and Gynec., 1924, vii, 541.
[48]Jones, Thomas E.: Illinois Med. Jour., 1924, xlv, 255. Also Wisconsin Med. Jour. 1924, xxii, 466.
[49]Kahn, A.: Arch. f. Gynäk., Berlin, 1924, cxxi, 335.
[50]Kellner, Daniel: Orvosi hetil., Budapest, 1923, lxvii, 645.
[51]Kelly, Howard A.: Therap. Gaz., 1924, xlviii, 311.
[52]Kottmaier, Jean: Fortschr. a. d. Geb. d. Röntgenstrahlen, Hamburg, 1924, xxxi, 749.
[53]Kross, Isidor: Am. Jour. Obst. and Gynec., 1924, vii, 310.
[54]Lackner, Julius E.: Personal Communication.
[55]Lockyer, Cuthbert: Brit. Med. Jour., 1924, p. 1037.
[56]Magid, M. O. and Klein, William: Am. Jour. Obst. and Gynec., 1924, viii, 79.
[57]Mayo, W. J.: Surg., Gynec. and Obst., 1924, xxxix, 511.
[58]Meaker, Samuel R.: Boston Med. and Surg. Jour., 1924, cxci, 495.
[59]Meaker, Samuel R.: Boston Med. and Surg. Jour., 1924, cxc, 286.
[60]Miller, C. J. (Watkins): Surg. Gynec. and Obst., 1924, xxxviii, 348.

after irradiation, pregnancy is apt to terminate in the premature birth of a dead fetus.

Kottmaier[52] reports three cases of pulmonary tuberculosis in which roentgen castration, carried out at one sitting, was followed by a marked aggravation and more rapid course of the disease. However the author does not advocate a general resumption of surgical procedures in this group of cases, but a more conservative roentgen sterilization in several exposures.

Saidman,[78] in a recent paper, has reported unusually good results with the ultra-violet rays in the treatment of ovarian disorders in doses which produced a mild actinic erythema. Reference is made to this paper so we may more clearly see the many inroads that are being made in the field of sound gynecologic practice.

Renewed interest in the nonsurgical treatment of ovarian and tubal infections is noticed during the past year. Fekete[26] reports marked improvement following the intravenous injection of calcium chloride, and notes alleviation even a few seconds after the intravenous injection. How much of this is due to psychotherapy? The theory of its therapeutic action is based on the assumption that calcium stimulates a flow of fluid from the tissues into the blood stream, thereby decreasing the local swelling of the inflamed part. The contraindications to calcium therapy are given as bacteriemia, absence of local findings, weakness and loss of strength.

Perie[72] emphasizes the employment of serotherapy, vaccines and protein therapy. The old idea of artificial production of leucocytosis also receives special mention in this paper and particularly the Klingmuller method of injection of turpentine into the periosteum of the ileum. This procedure produces a violent local reaction with an increase in the temperature, 39 to 40° C.

Marked constructive progress has been noticeable in the study of the solid tumors of the ovary.[32] Dougal[5] reports an interesting case of primary chorioepithelioma of the ovary and has collected ten cases of chorioepithelioma of the ovary from the literature. Newmann[67] reports an unusual case of carcinoma folliculoids or folliculoma of the ovary and discusses the many diversities of opinion as to the true nature of this type of tumor. Aschner and Meyer[67] believe that these tumors arise from residual granuloma cells. Clinically, they belong to the malignant blastomas. Bishop[6] made a thorough survey of the literature of solid ovarian tumors and has arrived at the conclusion that at best, these tumors are difficult to diagnose as to malignancy and has taken a somewhat extreme view in advising radical extirpation of all types of solid tumors of the ovary.

Cahill[11] calls our attention to the relative frequency of pelvic tumors in children under three years of age. A large number of ovarian tumors found in children are dermoids and teratomas. Rainey[76] reports a case of twisted ovarian dermoid in a child of two and a half years of age. Franceseo[29] studied the changes of blood vessels of tumors of the ovary and invariably found changes in the media and intima.

In a series of 296 abdominal operations, Sampson[79] reports 64 cases of endometrial implantations and emphasizes that similar implantation may occur with malignant endometrial tissue.

REFERENCES

[1]Anspach, Brooke M.: Gynecology. J. B. Lippincott Company, 1921.
[2]Bauereisen, A.: Monatschr. f. Geburtsh. u. Gynäk., Berlin, 1924, lxvii, 9.
[3]Becher-Rüdenhof, Frieda: Wien. Klin. Wchnschr., 1924, xxxvii, 545.
[4]Bégouin, P.: Bull. Soc. d'obst. et de gynéc. de Par. 1924, xiii, 255.
[5]Bergeret and Moulonguet, P.: (Dougal) Gynéc. et Obst., Paris, 1923, viii, 528.
[6]Bishop, Eliot: Am. Jour Obst. and Gynec., 1924, vii, 576.
[7]Bonney, V.: Practitioner, 1924, cxii, 137.
[8]Bordier, H., and Bouchet, G.: Arch d'électric. méd., Bordeaux, 1924, xxxii, 198.
[9]Bordier, H.: Paris méd., 1924, xiv, 84.
[10]Burckhardt-Socin, O.: Schweiz. med. Wchnschr., 1924, liv, 693.
[11]Cahill, James A., Jr.: Internat. Clinics, 1924, ii, 212.
[12]Chevrier, L., Fumery, J., and Dausse, C.: Rev. franç. de gynéc. et d'obst., 1924, xix, 193.
[13]Clark, J. G.: Ann. Surg., 1924, lxxx, 138.
[14]Clark, John G.: Internat. Clinics, 1924, i, 74.
[15]Corbus, Budd C., and O'Connor, Vincent J.: Surg., Gynec., and Obst., 1924, xxxviii, 119.
[16]Crile, G. W.: Illinois Med. Jour., 1924, xlv, 177.
[17]Crile, George, W.: Am. Jour. Obst. and Gynec., 1924, vii, 528.
[18]Cullen, Thomas S.: Ohio State Med. Jour., 1924, xx, 484.
[19]Cullen, Thomas S.: Atlantic M. J., 1924, 27:619.
[20]Deaver, John B.: Am. Jour. Obst and Gynec., 1924, vii, 299.
[21]Dickinson, Robert L.: Am. Jour Obst., 1924, viii, 583.
[22]Dorne, Maurice, and Stein, Irving F.: Illinois Med. Jour., 1924, xlv, 219.
[23]Dougal, Daniel: See reference[5]
[24]Driessen, L. F.: Strahlentherapie, Berl. u. Wein., 1924, xvi, 656.
[25]Dupont, Robert: Bull. Soc. d'obst. et de gynéc. de Par., 1924, xiii, 315.
[26]Fekete, Alexander von: Monatschr. f. Geburtsh. u. Gynäk., Berlin, 1923, lxiv, 267.
[27]Flores, Giuseppe Satta: Ann. di ostet. e ginec., Milano, 1924, xlvi, 40.
[28]Fraenkel, Manfred: Strahlentherapie, Berlin, 1924, xvi, 690.
[29]Sebastianodi, Francesco: Arch. f. Gynäk., Berlin, 1924, cxxii, 129.
[30]Frank, Robert T.: Jour. Kansas Med. Soc., 1924, xxiv, 132.
[31]Frank, Robert T.: Colorado Med., 1924, xxi, 123.
[32]Geist, Samuel H.: Amer. Jour. Obst. and Gynec., 1924, vii, 567.
[33]Glaevecke, Carl: Monatschr. f. Geburtsh. u Gynäk., Berlin, 1924, lxvii, 47.
[34]Goldstine, Mark T., and Fogelson, Samuel J.: Surg. Gynec., and Obst., 1924, xxxviii, 753.
[35]Gosset, A., and Monad, Robert: Paris Méd., 1924, xiv, 158.
[36]Goullioud: Gynéc. et Obst., 1924, ix, 268.
[37]Greenough, Robert B.: Surg., Gynec. and Obst., 1924, xxxix, 18.
[38]Guillemin: Bull. Soc. d'obst. et de gynéc. de Paris, 1924, xiii, 321.
[39]Hafkesbring, Roberta, and Collett, Mary E.: Am. Jour. Physiol., 1924, lxx, 73.
[40]Heaney, N. Sproat: Surg., Gynec., and Obst., 1924, xxxviii, 692.
[41]Heinsius, Fritz: Monatschr. f. Geburtsh. u. Gynäk., Berlin, 1923, lxv, 17.
[42]Hempel-Jorgensen, P.: Acta gynec. scandin., Helsingfors, 1924, iii, 218.
[43]Hildebrandt, Otto: Monatschr. f. Geburtsh. u. gynäk., Berlin, 1924, lxv, 275.
[44]Hirst, Barton Cooke: Am. Jour. Obst., and Gynec., 1924, viii, 1.
[45]Huhner, Max: Am. Jour. Obst. and Gynec., 1924, viii, 63.
[46]Jaschke, Rudolf: München. med. Wchnschr., 1924, lxxi, 667.
[47]Jones, Thomas E.: Am. Jour. Obst. and Gynec., 1924, vii, 541.
[48]Jones, Thomas E.: Illinois Med. Jour., 1924, xlv, 255. Also Wisconsin Med. Jour. 1924, xxii, 466.
[49]Kahn, A.: Arch. f. Gynäk., Berlin, 1924, cxxi, 335.
[50]Kellner, Daniel: Orvosi hetil., Budapest, 1923, lxvii, 645.
[51]Kelly, Howard A.: Therap. Gaz., 1924, xlviii, 311.
[52]Kottmaier, Jean: Fortschr. a. d. Geb. d. Röntgenstrahlen, Hamburg, 1924, xxxi, 749.
[53]Kross, Isidor: Am. Jour. Obst. and Gynec., 1924, vii, 310.
[54]Lackner, Julius E.: Personal Communication.
[55]Lockyer, Cuthbert: Brit. Med. Jour., 1924, p. 1037.
[56]Magid, M. O. and Klein, William: Am. Jour. Obst. and Gynec., 1924, viii, 79.
[57]Mayo, W. J.: Surg., Gynec. and Obst., 1924, xxxix, 511.
[58]Meaker, Samuel R.: Boston Med. and Surg. Jour., 1924, cxci, 495.
[59]Meaker, Samuel R.: Boston Med. and Surg. Jour., 1924, cxc, 286.
[60]Miller, C. J. (Watkins): Surg. Gynec. and Obst., 1924, xxxviii, 348.

[61]Miller, C. Jeff.: New Orleans Med. and Surg, Jour., 1924, lxxvi, 355.
[62]Miller, C. Jeff: Am. Jour. Obst. and Gynec., 1924, viii, 333.
[63]Moench, Laura M.: Jour. Lab., and Clin. Med., 1924, ix, 289.
[64]Montague, J. F.: Med. Jour. and Record, 1924, cxix, 604.
[65]Montague, J. F.: Arch. Dermat. u. Syph., 1924, x, 42.
[66]Moorer, M. P.: Jour. Am. Med. Assn., 1924, lxxxiii, 766.
[67]Neumann: Arch. f. Gynäk., Berlin, 1923, cxx, 334.
[68]Norris, Charles C. and Vogt, M. E.: Am. Jour. Obst. and Gynec., 1924, vii, 550.
[69]Orlowski, P.: Ztschr. f. Sexualwissensch, 1924, xi, 94.
[70]Paroli, Giovanni: Riv. d'ostet. e ginec. prat., Palermo., 1924, vi, 120.
[71]Pemberton, Frank A.: Am. Jour. Obst. and Gynec., 1924, viii, 5.
[72]Perie, Joseph: Casop. lek. cesk., Prague, 1924, lxiii, 1422.
[73]Peyser, Fritz: Arch. f. Gynäk., Berlin, 1924, cxxii, 1.
[74]Portmann, Ursus V.: Am. Jour. Obst., 1924, vii, 533.
[75]Portze, O., and Wagner, G. A.: Ztschr. f. d. ges. Neurol u. Psychiat., Berlin und Leipz., 1924, lxxxviii, 157.
[76]Rainey, Warren R.: Ann. Surg., 1924, lxxix, 879.
[77]Ries, Emil: Not published.
[78]Saidman, Jean: Bull. de l'acad. de méd., Paris, 1924, xcii, 938.
[79]Sampson, John A.: Surg., Gynec. and Obst., 1924, xxxviii, 287.
[80]Scheffzek, Fr. A.: Montschr. f. Geburtsh. u. Gynäk., Berlin, 1923, lxv, 61.
[81]Schickelé, G.: Gynéc. et Obst., Paris, 1924, ix, 1.
[82]Schickelé, G.: Gynéc. et Obst., Paris, 1924, ix, 9.
[83]Schickelé, G.: Paris méd., 1924, xiv, 572.
[84]Schickelé, G.: Bull. Soc. d'obst et de gynéc. de Par., 1924, xiii, 80.
[85]Schmitz, Henry: Am. Jour. Obst. and Gynec., 1924, vii, 449.
[86]Schochet, Sydney S.: Personal Communication.
[87]Schochet, S. S.: Surg., Gynec., and Obst., 1924, xxxviii, 759.
[88]Schulte, Josef: Arch. f. Gynäk., Berlin, 1924, cxxi, 446.
[89]Seitz, and Wintz, quoted by Hempel-Jorgensen.
[90]Shaw, William Fletcher: Jour. Obst. and Gynec., Brit. Emp., Manchester, 1924, xxi, 41.
[91]Smith, Richard R.: Surg. Gynec. and Obst., 1924, xxxviii, 216.
[92]Sturmdorf, Arnold: Rhode Island Med. Jour., 1923, vi, 179.
[93]Tenconi, C.: Ann. di ostete. ginec., Milan, 1924, xlvi, 49.
[94]Tourneaux, J. P.: Bull. Soc. d'obst. et de Gynéc. de Par., 1924, xiii, 161.
[95]Willis, George Stuart: Med. Jour. and Record. (supp.), 1924, cxx, 146.
[96]Winter, G.: Arch. f. Gynäk., Berlin, 1923, cxx, 270.
[97]Winter, G.: Ztschr. f. Geburtsh. u. Gynäk., Stuttgart, 1924, lxxxvii, 225.
[98]Watkins, T. J.: Wisconsin Med. Jour., 1924, xxiii, 123.

Selected Abstracts

Diseases of the Urinary Tract

Blum, Eisler and Hryntschak: Cystoradioscopy. Wiener Klinische Wochenschrift, 1920, xxxiii, 677.

The authors describe the filling and emptying of the urinary bladder observed by means of the fluoroscope, using a 5 to 10 per cent potassium iodide solution in the bladder. They believe the method is valuable for the diagnosis of diverticula and trabecula. The danger of doing harm by using the x-rays can be avoided by suitable filtration and short exposures. They designate the filling as diastole and the emptying as systole of the bladder.

Ten to thirty c.c. of the solution in the normal bladder, (patient standing) gives a saucer-shaped shadow in the anteroposterior view. As more is introduced, by means of a catheter and syringe, up to 200 c.c., the upper edge of the shadow rises and the ends thicken until the shadow is almost rectangular with rounded corners. Seen from the side with 10 to 30 c.c. in the bladder, the shadow resembles a cone with the smaller end up. As more is introduced up to 200 c.c. the shadow becomes ovoid with the smaller end up.

Now if with 200 c.c. in the bladder the detrusor muscles contract, the rectangular shadow seen in the anteroposterior view becomes circular and, as the fluid runs out, the shadow becomes concentrically smaller and smaller until the last drop is out. The shadow seen from the side during this process first becomes oval and then gradually decreases in size keeping the same shape.

If the fluid is allowed to run out through the catheter, and the detrusor muscle is not brought into action, the shadow is simply the reverse of that in the filling process, it does not become circular in the anteroposterior or oval in the side views.

When the bladder feels full to the patient, peristaltic waves can be seen in the shadow, more easily in the side view.

The authors intend to carry on further experiments in pathologic bladders concerning the problems of residual urine, valve action of the ureteral openings, and diverticula of the bladder. FRANK A. PEMBERTON.

Stevens: Urology in Women. Journal American Medical Association, 1923, lxxxi, 1917.

In a study of 200 nonpregnant women with urinary disturbance, Stevens found the symptoms were due to urinary tract conditions in 75 per cent, while lesions of the generative organs, although present in a large proportion of cases, were possible etiologic factors in only 27 per cent. In a series of 169 cases, he found urethral strictures in 55.4 per cent, whereas in thirty-seven calibrations ureteral strictures were found in 29.7 per cent. The author states that relief of symptoms is due more to dilatation of urethra than to dilatation of ureter. In a study of 3,642 cases, pyelitis was discovered in a little less than one per cent. However the author believes these figures in general are too low.

In his conclusions the author states that the most important etiologic factor in pyelitis of pregnancy is pressure on the ureters by the enlarged uterus. Drainage and lavage of the renal pelvis through ureteral catheters is the treatment of choice in pyelitis of pregnancy. In unilateral renal tuberculosis occurring during pregnancy, the affected kidney should be removed as soon as the diagnosis is made. WM. KERWIN.

Mills, Ralph G.: A Preliminary Study of Postoperative Catheterization. Chinese Medical Journal, 1921, xxxv, 217.

Mills draws the following conclusions: Urinary retention appears to be the most frequent in operations involving the pelvic structures, especially the rectum and peritoneal surfaces, and to decrease in frequency as that region is departed from. Urinary retention is favored by shock and consequent low blood pressure with decreased output of concentrated urine, by pain, nausea, and vomiting, plugs, packing and other mechanical factors causing perineal pressure, and by the presence of a neurotic temperament, having some relation to race and sexual activity. Such difficulty before puberty was rare. Urination after operation can be facilitated in most cases by crowding fluids during the twenty-four hours before operation, by the relief of postoperative nausea, pain and distention, and by various local methods and psychical influences.

In most cases urination will occur when sufficient fluid has accumulated in the bladder even though the amount may exceed somewhat the usual content of the viscus. Danger of rupture in the absence of pain is negligible within the first twenty-four hours, and the use of palpation and percussion will prevent this accident in any case. The establishment of a time limit within which a patient must void or be catheterized is a mistake and likely to do more harm than good. Catheterization is not altogether a harmless procedure and when repeated may lead to cystitis in weakened patients and those with residual urine.

Physicians and nurses should consider that the function of the catheter in postoperative conscious patients within the first twenty-four hours is limited to the relief of pain due to an accumulation of any amount of urine in the bladder and is not for the mechanical withdrawal of the fluid to prevent a possible overdistention or rupture of the organ. F. J. SOUBA.

Curtis, A. H.: Management of the Female Bladder After Operation and During Pregnancy: A Further Study of Residual Urine in Its Bearing on Urinary Tract Disturbances. Journal American Medical Association, 1923, lxxx, 1126.

The normal bladder is highly resistant to virulent bacteria and it is only when repeated catheterization is done after operations and during the course of pregnancy that this rule has exceptions. Residual urine is given as the cause in these exceptions. Since 1915 the following method of management of the bladder has been carried out by Curtis: Catheterization is avoided if possible; if the catheter has been employed it is thereafter used once daily until the patient has regained the power of complete evacuation. No patient is allowed to suffer from distention. One eighth per cent of silver nitrate is instilled after each catheterization. The urine is kept acid and hexamethylenamin is administered. Residual urine was found in sixty-four per cent of all the cases that were repeatedly catheterized. The most important part of the treatment is daily catheterization following micturition in the patients, in whom residual urine is found. He does not consider a retention of an ounce as indicating residual urine unless pus cells are found.

W. KERWIN.

Vogt: Urotropin Intravenously for Inability to Urinate Following Operation or Delivery. Muenchener medizinische Wochenschrift, 1924, xxiii, 737.

The writer discusses the various methods used locally and generally in the attempt to make patients void after a delivery or an operation, and especially the use of pituitary extract intravenously or intramuscularly. Using a catheter not only subjects the patient to a great deal of discomfort but also to infection with a possible troublesome cystitis, and a catheter once used means repeated catheteriza-

tions. The best results are obtained by the slow injection of 4 to 6 c.c. of a 40 per cent solution of urotropin given intravenously and repeated at two or four hour intervals until the patient voids. The urotropin seems to be not only efficient to influence the sympathetic control of the bladder muscles but also apparently has a specific action on the sphincter muscle itself. The author does not think that there is any nephritic or vesical condition which in any way would contraindicate the suggested medication. A. C. WILLIAMSON.

Haworth, J. K.: Retention of Urine Due to Haematocolpos and Haematometra in a Child. British Medical Journal, May 7, 1921, p. 673.

The author gives a short report of a girl, eleven years old, with a markedly distended bladder. There was an imperforate hymen with a pronounced retention of menstrual secretion which produced a urinary retention. Incision of the hymen was followed by complete recovery. F. L. ADAIR.

Young: Urinary Incontinence in the Female. Journal American Medical Association; 1922, lxxix, 1753.

The author brings out the futility of methods used up to within the past few years. He ascribes the failure to arrive at a proper method of procedure to the anatomic ignorance of the operator. Young points out the necessity of carefully suturing the fascia and muscle forming the external sphincter of the bladder, and in a second group of cases the plication of the vesical sphincter itself, as the first step of the operation. He has met with no failures in eighteen cases. He divides these cases into two classes: (1) occurring in young women soon after childbirth; (2) in elderly women where the cause is a gradual stretching and giving away of the musculature at the neck of the bladder. He thinks the second class is preventable if proper instructions are given following childbirth. The symptomatology, diagnosis and anatomy, and the operative technic are detailed in full. WM. KERWIN.

Bonney: Diurnal Incontinence in Women. The Journal of Obstetrics and Gynaecology of the British Empire, 1923, xxx, 358.

Diurnal incontinence is common in parous women over forty. At first it is noticed only on coughing, sneezing, laughing, walking etc. Examination usually fails to reveal a pronounced cystocele but on straining down, the bladder and urethra will be found to wheel around the pubic angle until the meatus points upward and forward instead of downward and forward. At the height of the expulsive effort a jet of urine escapes. In these cases one is dealing with a relaxation of the anterior portion of the pubocervical muscle sheet, inaccurately called the pubocervical fascia. Normal urinary control depends more on the character of the meatus and the tone of the cervical muscle sheet supporting the fixed portion of the urethra than upon the so-called vesical sphincter. Any increase of intraabdominal pressure is accompanied by a contraction of the pubocervical muscle increasing the valve-like action of the urethra and preventing escape. Relaxation of the anterior or fixed portion of the urethra causes the urethra to roll under the pubis and sphincter control is lost. Incontinence does not accompany relaxation of the mid third of the pubocervical muscle (cystocele) or of the posterior third (prolapse of the vaginal wall). On the contrary urination in these cases may be difficult.

Success in operative treatment for incontinence of this type depends not upon constricting the urethra or the vesical neck, but upon strengthening and tightening the anterior end of the pubocervical muscle sheet. This is accomplished by

incising the anterior vaginal wall from a point above the urethrovesical junction almost to the meatus. The floor of the urethra is exposed and a series of sutures are inserted "Lembert wise" so as to overfold the tissue. H. W. SHUTTER.

Gayet: Bladder Fistula as a Result of Tuberculous Salpingitis. Archives Franco-Belges de Chirurgie, 1923, vii, 644.

After a careful review of the literature the author was able to find but a few case reports of this complication. In this paper he reports two such cases of his own.

Occasionally these fistulas may form by a direct adherence of the tubercular tube to the bladder with a secondary breaking down of the intervening walls. More commonly, however, there is a tuberculous abscess formed between the affected tube and the bladder. When such a fistula does occur, the usual sign and symptoms of tuberculous cystitis become manifest. The bladder contains a thick caseous pus. Cystoscopy will occasionally show an ulcerated area at the center of which may be found a small fistular tract from which pus issues. On the other hand this fistular tract may be so small that it cannot be found. It most often takes the form of a fissure between the folds of the bladder mucosa rather than a definite opening. Pressure on the abdomen or in the vagina will occasionally aid materially in its location by forcing more pus through the opening.

The bladder urine uniformly shows the presence of the Koch bacillus either by staining and microscopic examination or by the inoculation test. The condition may be differentiated from renal tuberculosis since ureteral urine in fistula cases fails to show tubercle bacilli.

Gayet does not feel that the spontaneous rupture into the bladder of a tuberculous tube is necessarily a curative process as is often the case with ruputre of a pyogenic tube but on the contrary, these patients if let alone usually fall gradually.

Another aid in the diagnosis is the use of x-ray after introduction of some opaque solution, such as 10 per cent collargol, into the bladder.

The treatment consists in a radical removal of the pelvic focus of infection. After that the bladder takes care of itself and the urinary symptoms disappear. So far as the fistula itself is concerned, it should be extirpated and the bladder edges closed if it can be easily found. If, on the other hand it is so small that it can be located only with great difficulty it should be let alone.

THEODORE W. ADAMS.

Pennisi: Uretero-cystostomy for Uretero-vaginal Fistula. Policlinico, sez. chir., 1920, xxvii, 362.

Ureterocystostomy first performed by Novaro now has large clinical sanction, but cases are not numerous in which a definitive success has been under adequate observation for a long period.

The author's patient after a criminal abortion, had a grave uterine infection, phlegmon of broad ligaments, pelviperitonitis, general septicemia. Colpotomy was done for fluctuating tumefaction in left vaginal fornix, followed by leakage of urine.

About twenty days after colpotomy the diagnosis of ureterovaginal fistula was made.

Operation about 70 days after colpotomy: Median laparotomy, adhesions between large omentum and left margin of uterus separated and some of them removed, left broad ligament shortened, and cicatricial ureter dissected out in its lower third; removal of left adnexa and of proximal ureteral stump imbedded in cicatricial tissue near bladder. Distal stump freshened and stutured into opening in bladder wall toward fundus, to left and a little posterior, with fine catgut; field of operation completely extraperitonealized; abdomen closed in three layers; no catheter in ureter nor in bladder.

Patient syringed every four hours, kept under opiate four days. On fifth day the patient urinated spontaneously.

She was discharged forty-two days after operation. Five years after operation, normal function of ureter and bladder, general good health.

P. GRAFFAGNINO.

Brodhead, George L.: Spontaneous Closure of Large Vesico-Uterine Fistula. Medical Record, 1920, xcviii, 437.

Brodhead reports the case of a sextipara, thirty-seven years of age, who had a normal parturition after a six hour labor. She passed urine normally for three days after the birth of her child. On the sixth day she came under Brodhead's care. She was then mildly septic and incontinent. Vaginal examination revealed an opening the size of the finger leading from the region of the internal os to the bladder from which urine freely escaped. The fistula was open for about three days, then closed and remained closed. C. O. MALAND.

Dyke and Maybury: On the Attempted Production of an "Ascending" Renal Infection in Rabbits. The British Journal of Surgery, 1924, xii, 106.

These authors made a series of experiments on rabbits in an effort to bring about an ascending infection from the bladder. Emulsions of cocci were injected into the bladder and, in other cases, sponges soaked in bacterial cultures were introduced into the bladder and allowed to remain. In none of these cases was any evidence of infection found in the kidney. In another series carmine and India ink were introduced in suspensions into the bladder and the urethra ligated. In no case were particles of pigment demonstrable above the bladder. By infecting the ureters it was found possible to obtain an infection of the kidneys. The authors feel, however, that this was due to a direct extension of the infection along the epithelium, rather than to a regurgitation of the renal pelvic contents into the renal tubules. R. E. WOBUS.

Baker: An Analytical Study of Fifty Cases of Ureteral Stricture and Pyelitis. Annals of Surgery, 1921, lxxiii, 348.

In this series of cases comprising females, aged from thirteen to sixty, the disease had existed from one to twenty-five years. Basing his assumption on the work of Rosenow, and Bumpus and Meisser, that kidney infection is often blood-borne, Baker incriminates the tonsils in 42 per cent, the teeth in 22 per cent, both in 14 per cent, and the antrum in 4 per cent. In 18 per cent no focus of infection was demonstrable. In all but one case, ureteral stricture was demonstrable. The diagnosis was largely based on the history, pus being present in only 60 per cent at time of examination.

Baker concludes that hematogenous infection, coupled with a strictured ureter, is the most frequent cause of pyelitis. R. E. WOBUS.

Schwarz: The Therapy of Pyelitis. Therapeutische Halbmonatshefte, 1920, xxxiv, 693.

Almost all authorities are agreed that the acute attack of pyelitis subsides under expectant treatment and only in a minority of cases does the condition pass over into a subacute or chronic one. The frequently long continued fever, however, has a markedly detrimental effect upon the patient. On the other hand, a single ureteral catheterization combined, if necessary, with drainage of the kidney pelvis for a short time may cause an abrupt fall in temperature and relief of the attack.

More important is the fact that cases under medical treatment may be clinically cured yet carry pus and pathogenic organisms in their urine for years. Such patients are subject to the possibility of an acute flare-up at any time. Some authorities feel that most of the pyelitis of adult life represents only an exacerbation of an uncured pyelitis dating from childhood. Whereas, of 80 cases treated medically, Lenhartz found only 16 bacteriologically cured and 20 improved; Helweg, in 17 cases treated by pelvic lavage, had 15 permanent cures, and Hartmann 16 cases with 13 cures.

Other methods of treatment recently recommended are extreme concentration of the urine by limitation of fluids in conjunction with acid sodium phosphate and the urinary antiseptics, as urotropin or salol. The urine in ten cases of acute, subacute and chronic pyelitis treated in this way by Haas was rendered permanently sterile in four days. Autovaccines as well as the intravenous injection of urotropin have given only temporary results. Nonspecific protein therapy has not yet been sufficiently tried out. Salvarsan has given brilliant results in the limited group of cases due to cocci, especially gonococci, sterilizing the urine permanently by one or at most two injections, yet it is of no value in the coli infections which comprise 70 to 90 per cent of all cases.

Chronic cases should all be subjected to instrumental examination to determine the exact source of the pyuria and the extent of associated kidney damage.

All cases should be diagnosed as early as possible and treatment continued until they are permanently free from pus and bacteria.

MARGARET SCHULZE.

Robinson, A. Leyland: A Note on Injuries to the Female Ureter. British Medical Journal, May 7, 1921, p. 665.

The author calls attention to the frequency of injury to the ureter in pelvic surgery. He brings out the points which are useful in the recognition of the ureter during operation. He mentions the results which may follow from bilateral and unilateral injury. He mentions the ideal treatment as being immediate repair or implantation, but emphasizes the point that it may not be feasible in all cases and that it does not give uniformly good results. F. L. ADAIR.

Gouverneur: Suture of the Ureter. Gynécologie et Obstétrique, 1920, ii, 231.

After section of a ureter, the best method of repair is transplantation of the proximal end into the bladder. If the distance to the bladder is too great to allow of this procedure, the cut ends of the ureter must be anastomosed. There are two methods of anastomosis: The end-to-end method similar to vascular sutures, and the method of invagination such as that of Ogge. Of the two, the author prefers the direct end-to-end anastomosis. Upon the perfection of the suture depends the final result. It is superior to the invagination method in that it is simple and rapid, does not require the dilatation of the distal cut end, nor leave such a wide band of constriction after healing.

After end-to-end anastomosis there is always a ureteral dilatation proximal to the suture which next involves the pelvis of the kidney and ends finally in renal atrophy. This explains why the end-results of ureteral anastomosis are not good from a functional standpoint. However, the operation must be conserved because a deficiency is better than a total suppression following nephrectomy or ligation of the ureter. R. T. LAVAKE.